Official Journal of
The American Radio
Relay League

QST

devoted entirely to

AMATEUR RADIO

May 1998

$1-

QST reviews:
- Kachina 505DSP HF transceiver
- Cherokee AH-50 6-meter FM H-T

Operate your station by remote control

Build a lightweight Yagi antenna for 40 meters

New Ham Companion:
Practical information for all hams

Planes and PACSATs Over the Arctic!

0 71896 47322 3
837044

ICOM IC-746

HF/6M/2M with IF-DSP and 100 Watts, Even On 2 Meters

PC Remote Control
Windows™ software, RS-746, developed by ICOM

Pull out more signals. DX'ing? Even faint signals buried in noise can't hide from the '746's adjustable IF-DSP noise reduction.

Eliminate adjacent frequency interference with Twin Passband Tuning, 3 optional filter slots (front panel selectable), and a selectable DSP Audio Peak Filter (320/160/80 Hz). The '746's DSP Auto Notch eliminates multiple hetrodyne signals.

One look at the large LCD display says it all. A glance "above the line" instantly lets you know all operating conditions and settings. Look "below the line" for menu selection, 5 soft key functions (which vary with the menu), passband width, and a band scope to search for signals.

Time to Upgrade
Solar Cycle 23 is just coming in to full swing. With the HF and 6 meter bands starting to opening up, there'll be more amateur fun, day and night!

Built in Auto AntennaTuner
No external antenna tuner is required for HF and 6M operation. The IC-746 is a real HF rig!

SPECIFICATIONS

Transmit: ..... HF/6 Meter/2 Meter, 100% Duty Cycle
Receive: ..... 30-60, 108-174 MHz Quadruple conversion superhetrodyne
Mode: ..... AM, FM, FM-N, SSB, CW, RTTY
Power: ..... 5-100 Watts (2-40W, AM)
Power Supply Requirement: ... 13.8 V DC
Memory Channels: ..... 102 Total, 99 regular, 2 scan edges, and 1 call
Size: ..... 11.3(W) x 4.7(H) x 12.5(D) in. 287(W) x 120(H) x 316.5(D) mm.
Weight (approx.): ..... 19 lb, 10 oz / 8.9 kg

FEATURES

- **IF-DSP (15.625 kHz)**
  - Noise Reduction
  - Automatic Notch Filter
  - Selectable Audio Peak Filter
- **Twin Pass Band Tuning (PBT)**
- **Multi-Function LCD Display**
  - Band Scope, Memory Names, Key Assignments, PBT Settings, Split Frequency, Memory Keyer Contents
- **3 Optional Filter Slots**
  - 2 for 9 MHz, 1 for 455 kHz
  - All Front Panel Selectable
- **Digital, Multi-Function Metering**
  - Signal Strength, RF Output, SWR, and ALC levels
- **Auto Antenna Tuner**
- **RF Speech Compressor (not AF)**
- **Tone Squelch and Tone Scan**
- **Auto Repeater Duplex Setting for 2 Meters**
- **Quick Split Function**
- **Complete CW Functions**
  - 4 Ch. Memory Keyer
  - Electronic Keyer
  - CW Pitch Control
  - Full Break In (QSK)
- **Vox**
- **Voice Synthesizer (opt)**
- **Triple Band Stacking Register**
  - Remembers tuner selection, preamp, antenna, mode and frequency for last 3 frequency selections

Call Button
One touch recall of user programmed frequency and mode

RF Gain and Squelch
Programmable RF gain, squelch, or both

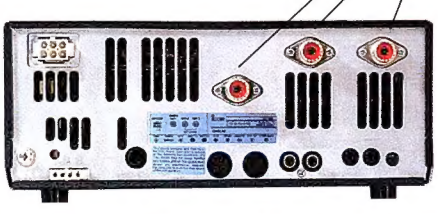
Continuously Adjustable Power Level
5-100 W variable

3 Antenna Connectors
Two for HF & 6M, and one for 2M

Digital Metering (on LCD)
Measures three parameters, all at once

SmarTune™
Automatically senses how fast you want to tune by how fast the knob is turned

Quick RIT/XIT Access
with zeroing function for today's crowded bands



Get more out of your HF. Let the digitally-advanced '746 give you the edge, and still hand you the best of 6 and 2 meters. For a free brochure, call **425-450-6088**

PC Ready!

ICOM options required for for PC operation:
CT-17 Level converter
RS-746 Windows™ Remote Control Software
OPC-478 Connection Cable

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ICOM IC-2100H

55 Watt, 2 Meter Rig that's Simple to Use and Land Mobile Rugged

Simple & Straightforward
Plug in, power up, and GO!

More Power When You Need It. Expand your VHF coverage. Use 55 watts for VHF DX'ing, or power down to 10 or 5 watts for local talk.

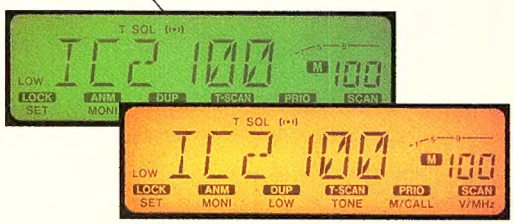
Improved Intermod Rejection. Our best performer against RF interference. New circuit design provides 75 dB in-band and 93 dB out-of-band IMD performance, while an adjustable attenuator (up to 10 dB) helps prevent overload from stronger signals.

Total Tone Control. Program up to 50 CTCSS encode/decode tones. Don't know the right repeater tone? The '2100H's tone scan seeks out and determines repeater access tones.

Selectable Green or Amber Display Backlight
Gives easy viewing in any lighting condition, and makes for a nice, customized look. Four different lighting levels, too.

Cool Dual Display

Selectable Green or Amber



Two User Programmable Keys
Customize your quick access selections

Backlit DTMF Hand Mic
HM-98S, with green backlight, is standard

PC Ready!

ICOM options required for PC operation:
OPC-478
Cloning cable,
CS-2100
Cloning software

SPECIFICATIONS

Transmit	144-148 MHz
Receive	136-174 MHz*
Mode	FM
Power	55/10/5 Watts (selectable)
Memory Channels	113 total With 100 regular, 3 scan edge pairs, 3 log, 3 repeater, and 1 call per band
Size	5.5(W) x 1.6(H) x 7.1(D) in. 140(W) x 40(H) x 180(D) mm.
Weight	2 lb, 10 oz /1.2 kg

FEATURES

- **Die Cast Aluminum Chassis**
  - One piece construction
  - Large, heat dispersing fins
  - High duty cycle
- **Built to Military Specifications (MIL STD) 810 C/D/E Shock/Vibration**
- **Alphanumeric Display**
  - Programmable by front panel, PC cloning, or radio to radio cloning
  - 4 backlighting levels
- **DTMF Hand Microphone (HM-98S)**
- **CTCSS Encode/Decode Standard**
  - 50 tone frequencies
  - For repeater or tone squelch use
  - Independently programmable Tx/Rx
- **Tone Scan**
- **Priority Watch (3 types)**
- **Attenuator**
- **Auto Repeater with Busy Lockout**
- **Wireless Remote Options**
  - HM-90 Infrared Wireless Microphone
  - EX-1579 Infrared Receiver
  - EX-1513 Infrared Sub Receiver

*Reception guaranteed only on 2 meter ham band.

Soft Key Controls
are easy to use and eliminate the dreaded "Function Key"

Large Selection Knob
Easy on the go operation

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MIL STD 810 C/D/E

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- ✔ **Free car adapter included!**

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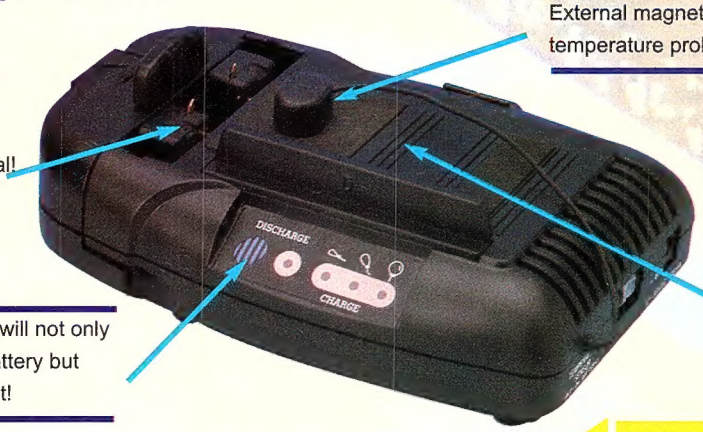

External magnetic temperature probe!

The breakthrough adjustable contacts make it truly universal!

Powerful magnet that will hold your battery pack in place!

The MH-C777 will not only charge your battery but also condition it!

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- ✔ **New technology**
- ✔ **No** memory effect
- ✔ 50-100% **more** capacity than same size NiCad
- ✔ **Light** weight
- ✔ Flat Discharge Curve
- ✔ **Small** Size
- ✔ Environmental **friendly**
- ✔ Many **other** models available
- ✔ **One** Year Limited Warranty for all battery packs

900mAh

MH-PB-34
For Kenwood TH-79/22/42
900mAh, 9.6v

1800mAh

MH-FNB-V47
For Yaesu FT-50R/10R/40R
1800mAh, 7.2v

1000mAh

MH-BP-180
For Icom T7A/T22A/W32
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MH-A301

Maha offers reliable, powerful, and economical power amplifiers. Ranging from 35 watts to 100 watts output power, the different **PowerAmp** models give you versatile functions. On some models, they are equipped with the state-of-art **GaAsFET pre-amplifier**, enhancing your receiving capability. Operate Maha PowerAmp and commence reliable and enjoyable communications!

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- ✔ Output Indicator, and more....
- ✔ FM/SSB/CW All Mode!!

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MH-A102: 2m/35W @ 5W Pre-Amp, SSB/FM
MH-A103: 2m/50W @ 5W Pre-Amp, SSB/FM
MH-A201: 2m/70cm 45/35W @ 5W
MH-A301: 2m/50W @ 5W Pre-Amp
MH-A302: 2m/70cm 45/35W @ 5W

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Change your handheld into a powerful mobile, *instantly!*

Maha's new **docking boosters** are the affordable solutions to your weak signal problems. The MH-A300 series docking booster utilizes a compact amplifier, and with the appropriate adapter, you will boost the 5 watt output power of your handheld to the higher output power of a more expensive mobile radio while maintaining the portability of your handheld. You can instantly switch from a powerful mobile radio to a portable handheld with ease! Put your radio on Maha's new MH-A300 series docking booster and see what it can do for you!

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New Ham Companion:
Practical information for all hams
Planes and PACSATs Over the Arctic!

Our Cover

In 1997, The Explorers Club attempted an aeronautical expedition to the North Pole using a restored Russian Antonov AN2 biplane. In an unusual twist to an already unusual project, the crews used amateur packet satellites to report their progress. See the complete story in this issue!

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- *Multi48™ Inductor*
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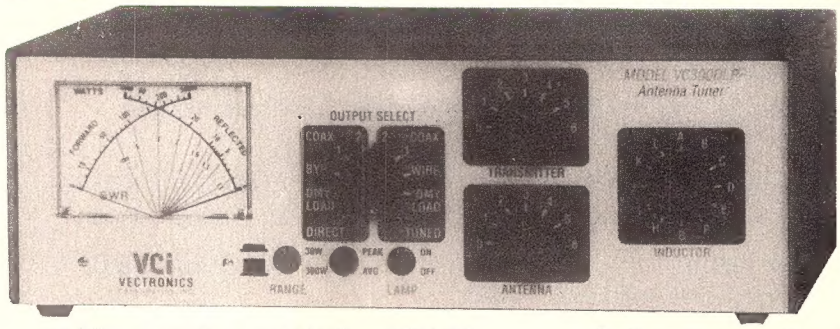
$159.95



The VECTRONICS VC-300DLP is the world's most versatile 300 Watt antenna tuner!

You'll get everything you've ever wanted . . . precise inductance control that rivals roller inductors . . . the ability to match any real antenna . . . full 1.8-30 MHz coverage . . . peak reading backlit Cross-Needle Meter . . . 8 position antenna switch . . . built-in 50 Ohm dummy load . . . finest components available and world class quality.

Precise Inductance Control

VECTRONICS' exclusive *Multi48™* inductor gives you *forty-eight* inductance values -- you'll get precision tuning that rivals the most expensive roller inductors.

Tune any antenna 1.8-30 MHz

You can tune any real antenna from 1.8 to 30 MHz, including all MARS and WARC bands. Use verticals, dipoles, inverted vees, yagis, quads, long-wires, whips, G5RVs, etc.

Has 4:1 balun for balanced line antennas.

Handles up to 300 Watts SSB PEP, 200 watts continuous (150 Watts on 1.8 MHz).

Peak Reading Cross-Needle Meter

The VC-300DLP backlit Cross-Needle meter displays SWR, forward and reflected power simultaneously. Reads both peak and average power on 30/300 watt scales. Meter lamp has front panel switch and uses 12 VDC or 110 VAC with AC-12 adaptor, $12.95.

Versatile Antenna Switch

The VC-300DLP eight position antenna switch lets you select two coax fed antennas, random wire/balanced line or built-in dummy load for use through your tuner or direct to your transceiver. Bypass position bypasses your tuner but keeps your SWR Power meter in line.

Built-in Dummy Load

A built-in 50 Ohm dummy load makes tuning up your rig easy! Use it for testing and repairing your rig, setting power level, adjusting your mic gain and more.

World Class Quality

The finest components available and the highest quality construction gives you the *best* 300 Watt antenna tuner that you can buy.

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Call toll-free 800-363-2922 and order any product from VECTRONICS. Try it for 30 days. If you're not completely satisfied return it for a full refund, less shipping and handling -- no hassles. All VECTRONICS products come with a one year warranty.

2 kW Antenna Tuner

HFT-1500 **$459.95**

You can tune any real antenna from 1.8 to 30 MHz for absolute minimum SWR.

The HFT-1500 is crafted of the finest components available . . . two *heavy duty* 4.5 kV transmitting variable capacitors and a *high current* roller inductor with a precision 5 digit *gear* driven turns counter. Gives you arc-free operation up to 2 kW PEP SSB.

Has backlit, peak-reading Cross-Needle SWR/Power meter, *SSB*Analyzer Bargraph™*, 6 position *ceramic* antenna switch, 4:1 Ruthroff balun for balanced line. Scratch-proof Lexan front panel. 5.5x12.5x12 inches.

300 Watt *Mobile* Tuner

VC-300M **$109.95**

The VC-300M *Mobile* Antenna Tuner is compact, lightweight, easy-to-operate and is our most economical tuner.

It's compatible with *any* mobile antenna and *any* mobile HF transceiver and is compact enough to fit in the most compact car.

It can also be used at home with dipoles, vees, verticals, beams or quads fed by coax.

Backlit dual movement meter simultaneously monitors Power and SWR. Covers 1.8-30 MHz. Handles 300 Watts SSB PEP, 200 Watts continuous, (150 Watts on 1.8 MHz.). 7.25x8.75x3.6 in. Weighs 3.4 lbs.

SWR/Power Meters

PM-30 **$79.95**

PM-30UV **$89.95**

PM-30, $79.95, for 1.8 to 60 MHz. Displays forward and reflected power and SWR simultaneously on dual movement Cross-Needle Meter. True *shielded* directional coupler assures accuracy. Backlit meter displays peak or average power in 300/3000 Watt ranges. First-rate construction includes scratch-proof case/front panel. 5.3x5.75x3.5 inches. SO-239 connectors.

For 144/220/440 MHz, 30/300 Watt ranges. PM-30UV, $89.95, has SO-239 connectors. PM-30UVN, $89.95, has N connectors. PM-30UVB, $89.95, has BNC connectors.

1500 Watt *dry* Dummy Load

DL-650M, $64.95. Handles 100 watts continuous, 1500 Watts for 10 seconds to 650 MHz. Ceramic resistor. SWR < 1.3. SO-239 connector. **DL-650MN, $69.95** has N connector.

Low Pass TVI Filter

LP-30, $69.95. Eliminates TVI by attenuating harmonics at the source. Plugs between transmitter and antenna or tuner. Handles 1500 watts.

High Pass TVI Filter

HPF-2, $24.95. Installs between VCR/TV and cable TV or antenna lead-in cable. Eliminates or reduces interference caused by nearby HF transmitters.

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ICOM IC-T8A

Super Compact 6M/2M/440MHz Tri-Bander with Loud, Crisp Wide Band Rx

SMA Antenna Base
Provides extra support and durability

Add a new dimension of fun. 6 meter activity is quickly growing. Get in on the fun! With ICOM's new 'T8A, work 6 meter repeaters, right from your hand.

Simplicity, straight out of the box. Function keys can be confusing and difficult to learn. Fortunately, the 'T8A doesn't use any! It's so easy to use, many operators claim that they never needed to use the instruction manual.

Listen beyond the ham bands. Pick up incredibly clear, wide band* reception. Tune in a ball game (radio *or* TV broadcast), listen to air traffic control, or scan for police activity. Take the 'T8A everywhere!

*Reception guaranteed only on ham bands.

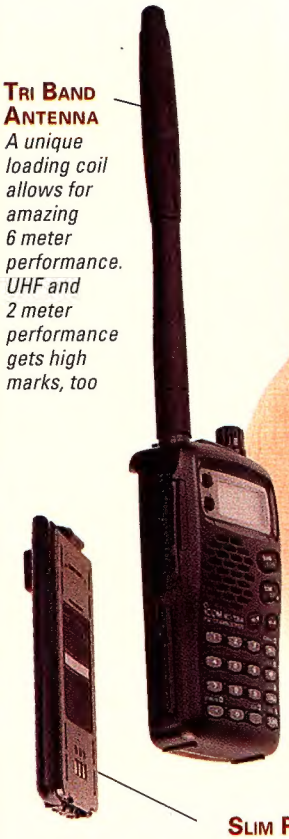
SPECIFICATIONS

Transmit ..... 6 meter/2 meter/440 MHz
Receive ..... 50-54, 76-174, 400-470 MHz*
Pick up UHF, VHF, FM, AM Air Band, some TV Broadcast, and Public Safety, even deep inside most office buildings
Mode ..... FM (WFM Rx)
Power ..... Up to 5 Watts (13.5V)
Memory Channels ..... 123 total
With 100 regular, 10 scan edge pairs, and 1 call per band
Size ..... 2.3(W) x 4.2(H) x 1.1(D) in.
5(W) x 107(H) x 28.5(D) mm.
Weight ..... 9.9 oz / 280 g

FEATURES

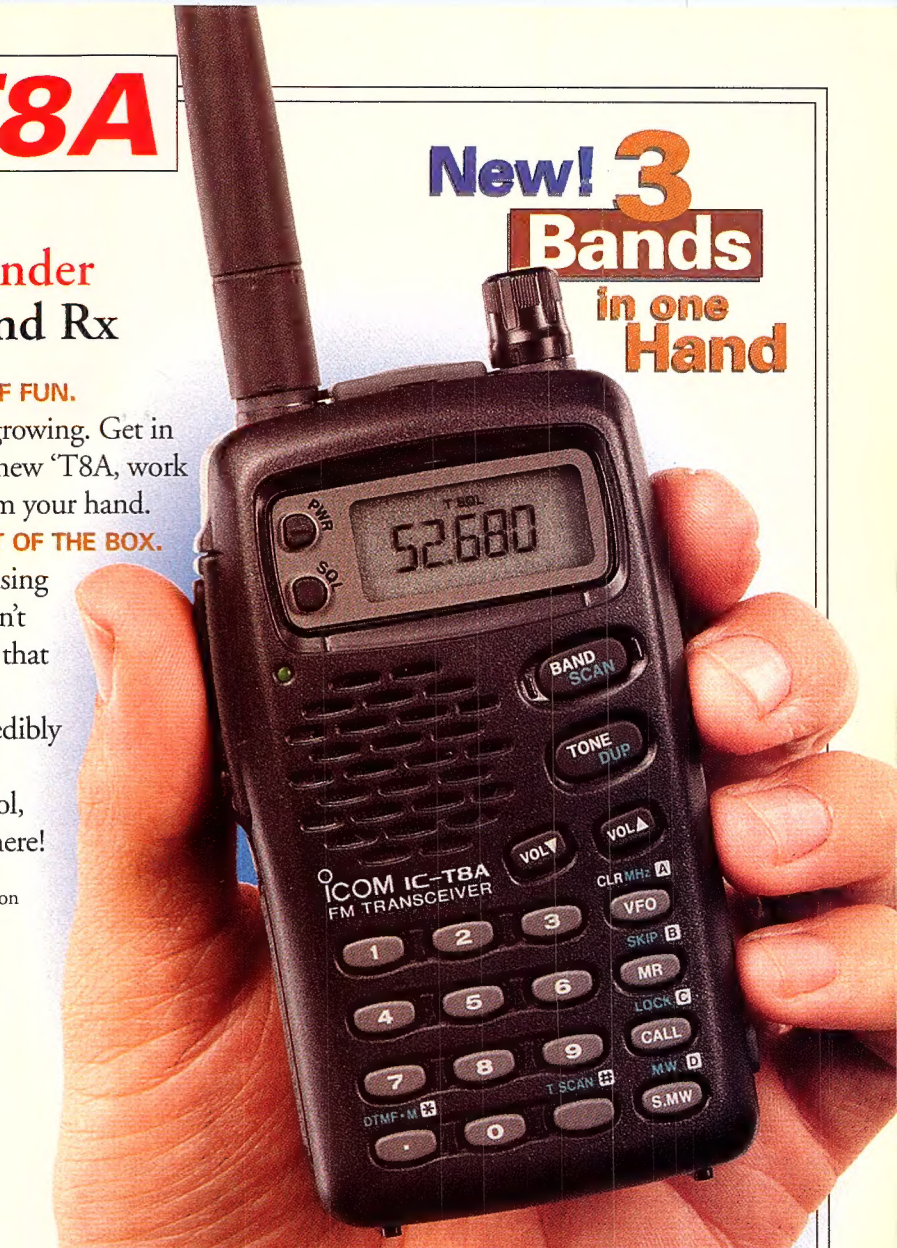
- **Slim, Powerful Ni-MH Battery****
  – 4.5 Watts @ 9.8V/680mAh (4-6 hrs)
- **Rugged ICOM Construction**
  – Die-cast aluminum chassis
  – JIS-4 water resistant rating
- **Built to Military Specifications (MIL STD) 810 C/D/E Shock/Vibration**
- **One-Touch Band Selection**
  – Work one band at a time
- **CTCSS Encode/Decode (Tone Squelch)**
  – Fully adjustable, with pocket beep
- **CTCSS Tone Scan**
- **DTMF Encoder with 9 Memories**
- **Backlit Alphanumeric Display**
  – Use a PC to name memory channels
- **Built-In Guide Function**
- **Auto Repeater**
- **Battery Voltage Indicator**
- **9 Tuning Steps**
- **"AA" Alkaline Battery Pack (optional)**
- **Wall Charger and Belt Clip Included**

**Early 'T8As (v.05) received 6.0V/700mAh batteries



Tri Band Antenna
A unique loading coil allows for amazing 6 meter performance. UHF and 2 meter performance gets high marks, too

Slim Profile
Back mounted Ni-MH battery (3/8" thin) snaps on with a snug "click", providing a secure fit



PC Ready!

ICOM options required for PC operation:
OPC-478 Cloning cable,
CS-T8 Cloning software

Now get the fun of 3 bands for the price of a mid-range dual-bander. Pick up a 'T8A today. For a free brochure, call **425-450-6088**

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What's So Unusual About This Arizona QTH?

Well, for one thing it is in a deed restricted, no antenna neighborhood. For another, great worldwide DX is worked from here regularly (long path, short path, pile-ups, even JA's on 160 meters!)

How Can This Be?

Come on around to the back yard and see for yourself.

The Alpha Delta/Outbacker® portable antenna system is the answer. The 12' Outbacker® Outreach™ antenna sits on the Alpha Delta Outpost™ Tripod Ground Coupler base system—no installation, no radials, no digging!

The performance is truly remarkable. In fact, any Outbacker® model mounts directly on the Outpost™ tripod. The Outreach™ and Outreach 500™ were custom designed for Alpha Delta for maximum portable efficiency —12 ft. long, 5/8 wave on the higher HF bands and center loaded on all bands for peak performance. Both models utilize the Outbacker® band tap system for multi-band operation.

These antennas have been DXpedition proved in all environments —bottom line, they work!

- Model Outreach™ —160 thru 10 mtrs., 150 watts.....$399.00
- Model Outreach 500™—80 thru 6 mtrs, 500 watts.....$439.00
- Model Outpost™—Ground Coupler Tripod.....$199.95

(All models have standard 3/8 x 24 mounting hardware)

The Alpha Delta Model VRC Variable Response Speaker System greatly enhances the receiving capabilities of your station, even when using a transceiver with full DSP capabilities. Ducted port bass reflex speaker design and twin "Sampled Data Switched Capacitor Audio Filter" circuitry does the trick. The Twin filters provide continuously adjustable sharp cut-off characteristics with the frequency read out, on an LED light bar, calibrated in kilohertz.

A unique peak/notch function is also provided, each with continuously adjustable bandwidths which can be set for optimum interference reduction from CW thru AM. Even with full DSP running on the transceiver, the peak can still pop a weak signal right up out of the noise.

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—Once you use the model VRC speaker, you'll never go back to a regular outboard speaker.

- Model VRC Variable Response Speaker Console.....$249.95

The compelling need for Alpha Delta products: You need to get on the air with a good signal, but don't have the space for a large antenna system. Alpha Delta provides the solution—DX or local.

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THE AMERICAN RADIO RELAY LEAGUE INC

The American Radio Relay League Inc is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communication in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1986. Its affairs are governed by a Board of Directors, whose voting members are elected every two years by the general membership. The officers are elected or appointed by the directors. The League is noncommercial, and no one who could gain financially from the shaping of its affairs is eligible for membership on its Board.

"Of, by, and for the radio amateur," the ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

A *bona fide* interest in Amateur Radio is the only essential qualification of membership; an Amateur Radio license is not a prerequisite, although full voting membership is granted only to licensed amateurs in the US.

Membership inquiries and general correspondence should be addressed to the administrative headquarters; see page 10 for detailed contact information.

Founding President (1914-1936)
Hiram Percy Maxim, W1AW

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"It Seems to Us..."

Volunteers

The ARRL has 170,000 members. It takes a full-time, professional staff to serve that many individuals, to represent their interests on a variety of fronts, and to produce and distribute *QST* and the League's other publications. Yet, this should not obscure the fact that most of the League's work on behalf of Amateur Radio is done by *volunteers*. This month let's offer them some well-deserved accolades; without their dedication, Amateur Radio long since would have ceased to exist.

Think of your own local community. If you're fortunate, the radio amateurs of your area are willing to work together through clubs, the ARES, and in other ways to ensure that Amateur Radio is regarded as a community asset. This doesn't just happen. It takes people to make it happen—people who willingly devote their time and talent, in cooperation with others, for no greater reward than the pleasure that comes from making a difference. Where this spirit lives, Amateur Radio will flourish. Where it doesn't, no amount of outside resources can take its place.

So it is throughout Amateur Radio. Instruction in how to become a radio amateur is given mostly by volunteers. Examinations are administered by volunteers. NTS traffic, training, and emergency nets are run by volunteers. Repeaters are maintained by volunteers and coordinated by volunteers. Conventions, hamfests, swap meets, and flea markets are organized by volunteers. QSL cards arriving for you from overseas are sorted and sent to you by volunteers; when you collect the right cards to earn an award, your application may be checked by a volunteer.

The basic unit of the ARRL Field Organization is the section, usually a state but sometimes part of a state. The Field Organization is made up entirely of volunteers. The ARRL Section Manager has one of the most important and demanding positions in Amateur Radio. The full members in the section elect one among them as SM, to be responsible for a wide range of activities within the section for a two-year term. In turn, the SM delegates specific functions to a team of appointees. Led by the SM, the team addresses the following purposes and objectives: emergency communications, message traffic, volunteer monitoring, RFI problem-solving, support of affiliated clubs, government liaison, encouragement of technical activities, public information and dissemination of on-the-air bulletins.

The elected SMs are responsible to the members for the operational side of ARRL activities. Responsible to the members for the policy side is another team of volunteers: the 15 elected Directors, who meet as a Board at least twice a year and who spend a great deal of time in between Board meetings hearing from members, working in committees, and studying the issues on which they will be voting. Serving alongside each Director is a Vice Director, elected by the membership and having the power of succession to the office of Director should a vacancy develop. The Directors elect the Executive Committee and the ARRL officers, all of whom are volunteers except the Executive Vice President and Chief Financial Officer. Yes, that's right—even the President is a volunteer!

Directors have their own support networks: Assistant Directors and Advisory Committee members who serve as a link between the Director and the individual members (on average, more than 10,000 per division). Other appointees serve the ARRL at the national level, as committee or task group members appointed by the President from outside the Board, Volunteer Counsel or Consulting Engineers, or Technical or Educational Advisors. We're continually finding new roles for volunteers, such as the position of Amateur Radio Direction Finding Coordinator that was created at the January Board Meeting.

We are fortunate indeed that the spirit of voluntarism extends beyond the borders of the United States. Only a few national Amateur Radio organizations in other countries are large enough to support more than a small administrative staff, if they can afford any at all. IARU Regions 1 and 3 have small paid office staffs to support the efforts of their volunteers; Region 2 does not. The officers of the IARU are all volunteers. Other individuals support the IARU in a variety of capacities: technical representation at ITU meetings and conferences, promotion of Amateur Radio in developing countries, coordination of beacons and the IARU Monitoring System, advising on international satellite and EMC issues, and other specialties.

The typical ARRL member is not content simply to support the League financially, consume its services, and read *QST*. The ARRL is *your* organization, and you want to be a part of the action. If this describes you, chances are that you already are serving, or have served, the Amateur Radio community as a volunteer. If so, please accept our thanks and congratulations; you are part of a proud tradition that stretches back unbroken to the founding of the League in 1914. If not, consider where your skills and interests may match the needs of your section and contact your SM (listed on page 12) to see if there's a place for you in the Field Organization.

Don't know your section? The quickest place to find out is the ARRL Web site, at **http://www.arrl.org/locate/**. Enter your city and state in the appropriate box, and back will come your ARRL division and section. If this is not convenient, call or write the Field Services Department and the staff will gladly look it up for you.—*David Sumner, K1ZZ*

We're At Your Service

ARRL Headquarters is open from 8 AM to 5 PM Eastern Time, Monday through Friday, except holidays. Our address is: 225 Main St, Newington, CT 06111-1494. You can call us at 860-594-0200, or fax us at 860-594-0259.

If you have a question, try one of these Headquarters departments . . .

	Contact	*Telephone*	*Electronic Mail*
Joining ARRL	Membership Desk	888-277-5289	**circulation@arrl.org**
***QST* Delivery**	Circulation Desk	860-594-0338	**circulation@arrl.org**
Publication Orders	Sales Desk	888-277-5289	**pubsales@arrl.org**
M-F Only, 8 AM to 8 PM Eastern Time (toll free)			
Regulatory Info	Tom Hogerty	860-594-0323	**reginfo@arrl.org**
Exams	VEC	860-594-0300	**vec@arrl.org**
Educational Materials	Educational Activities	860-594-0301	**ead@arrl.org**
Contests	Billy Lunt	860-594-0252	**contest@arrl.org**
Technical Questions	ARRL Lab	860-594-0214	**tis@arrl.org**
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Clubs	Vicky Armentano	860-594-0264	**clubs@arrl.org**
Hamfests	Gail Iannone	860-594-0262	**hamfests@arrl.org**

You can send e-mail to any ARRL Headquarters employee if you know his or her name or call sign. The second half of every Headquarters e-mail address is **@arrl.org**. To create the first half, simply use the person's call sign. If you don't know their call sign, use the first letter of their first name, followed by their complete last name. For example, to send a message to John Hennessee, N1KB, Regulatory Information Specialist, you could address it to **jhennessee@arrl.org** or **N1KB@arrl.org**.

If all else fails, send e-mail to **hq@arrl.org** and it will be routed to the right people or departments.

ARRL on the On-Line Services

We maintain accounts on these major on-line services and check for mail several times daily.

Service	*ARRL Address*
CompuServe	70007,3373
America Online	HQARRL1

ARRL BBS

The ARRL *Hiram* Bulletin Board System is as close as your telephone. Hiram offers more than a thousand software files for your enjoyment. You can also use Hiram to send messages to anyone at Headquarters—or to other hams who frequent the BBS. Hiram accepts up to four simultaneous connections at rates from 1200 to 28,800 baud.

Fire up your modem and call 860-594-0306.

Technical Information Server

If you have Internet e-mail capability, you can tap into the ARRL Technical Information Server, otherwise known as the *Info Server*. To have user instructions and a handy index sent to you automatically, simply address an e-mail message to: **info@arrl.org**
Subject: **Info Request**
In the body of your message enter:

HELP
SEND INDEX
QUIT

ARRL on the World Wide Web

You'll also find the ARRL on the World Wide Web at:

http://www.arrl.org/

At the ARRL Web page you'll find the latest W1AW bulletins, a hamfest calendar, exam schedules, an on-line ARRL Publications Catalog and much more. We're always adding new features to our Web page, so check it often!

Stopping by for a visit?

We offer tours of Headquarters and W1AW at 9, 10 and 11 AM, and at 1, 2 and 3 PM, Monday to Friday (except holidays). Special tour times may be arranged in advance. Bring your license and you can operate W1AW anytime between 1 and 4 PM!

ARRL Headquarters is within easy driving distance from Interstates 84 or 91. In addition, Hartford is served by Amtrak, with several trains daily from New York, Boston and beyond (call 1-800-USA-RAIL for more information). Bradley International Airport in Windsor Locks, Connecticut (about 20 miles north of Headquarters), is served by many major carriers.

Would you like to write for QST?

We're always looking for new material of interest to hams. Send a self-addressed, stamped envelope (55¢ postage) and ask for a copy of the *Author's Guide*. (It's also available via the ARRL Info Server, and via the World Wide Web at **http://www.arrl.org/qst/aguide/**.) The guide contains all the information you'll need to craft an article to meet our requirements. Send article ideas or manuscripts to the attention of the *QST* Editor (e-mail **qst@arrl.org**).

Press Releases and New Products/Books

Send your press releases and new book announcements to the attention of the ***QST* Editor** (e-mail **qst@arrl.org**). New product announcements should be sent to the Product Review Editor (e-mail **reviews@arrl.org**).

Strays and Up Front

Send your Strays and Up Front materials to the *QST* Features Editor (e-mail **upfront@arrl.org**). Be sure to include your name, address and daytime telephone number.

Interested in Becoming a Ham?

Just pick up the telephone and call toll free 1-800-326-3942, or send e-mail to **newham@arrl.org**. We'll provide helpful advice on obtaining your Amateur Radio license, and we'll be happy to send you our informative Prospective Ham Package.

ARRL Audio News

The best way to keep up with fast-moving events in the ham community is to listen to the ARRL Audio News. It's as close as your telephone at 860-594-0384, or on the Web at **http://www.arrl.org/arrlletter/audio/**.

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e-mail **kj5ae@arrl.org**

*Executive Committee Member

As an ARRL member, you elect the directors and vice directors who represent your division on ARRL policy matters. If you have a question or comment about League policies, contact your representatives at the addresses shown.

Work the World With Alinco!

Base, mobile, portable or marine, Alinco HF transceivers open a world of possibilities at prices that are down to earth. Check out these great radios and the low Alinco price at your favorite dealer!

DX-70T, DX-70TH HF + 6m

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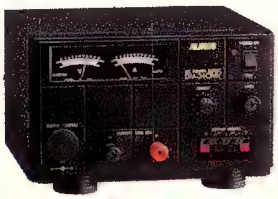
Rugged and versatile, DX-70 radios are recognized around the world as proven performers!

160m ~ 6m Amateur Band TX in all modes, general coverage RX 150 Khz ~ 30 MHz and 50 ~ 54 MHz, 2 VFOs, 100 memories, removable face for remote mounting, speech compressor, SSB, CW and AM narrow filters, full, semi or automatic break-in, multi-function control, RIT, TXIT, easy split operation, RF gain, CTCSS for 10 and 6 m repeaters. Both models feature 100w output on HF, DX-70TH has 100w output on 6m, DX-70T has 10w output on 6m.

DX-77T HF Desktop Transceiver

It's the radio Amateurs asked us to build!

Not a "channelized conversion", the DX-77T was built from the ground up to be a great performing HF radio. 160 ~ 10 m Amateur Band TX in all modes, general coverage RX 500 Khz ~ 30 MHz, 2 VFOs, internal keyer (6 ~ 50 wpm), 100 memories, 13.8 VDC input, optional computer control capability, CTCSS encoder (front panel programmable), RIT, easy split operation, speech compressor, selectable AGC, large front panel speaker. The value leader in HF desktop radios!



DM-340VDT DC Power Supply

30 amps nominal, 35 amps peak, 0~15 VDC variable output, meters included at no extra cost, convenient front panel connections, output connections include binding posts, spring clips and cigar lighter, circuit protection, perfect for base station operation or bench testing.

EDX-2 Automatic Wire Antenna Tuner

Equip your DX-70 or DX-77 with the Alinco EDX-2 Automatic Antenna Tuner. Quickly tunes antennas from 8 to 80 feet, for any band from 10 through 160 meters (minimum 40 foot wire antenna required for 160 meter use). Perfect for base, mobile or marine use. Plugs directly into Alinco DX-70 and DX-77 transceivers. You don't have to pay more for great performance!

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Specifications subject to change without notice or obligation. Performance specifications only apply to Amateur Bands. Transceivers intended for use only by properly licensed Amateur Radio operators.

Get to Know Your Section Manager

The 15 divisions of the League are arranged into 70 administrative *sections*, each headed by an elected *section manager* (SM). Your section manager is the person to contact when you have news about your activities, or those of your club. These news items could find their way into the pages of *QST*! If you need assistance with a local problem, your section manager is your first point of contact. He or she can put you in touch with various ARRL volunteers who can help (such as technical specialists).Your section manager is also the person to see if you'd like to become a section volunteer. Whatever your license class, your SM has an appointment available.

Atlantic Division

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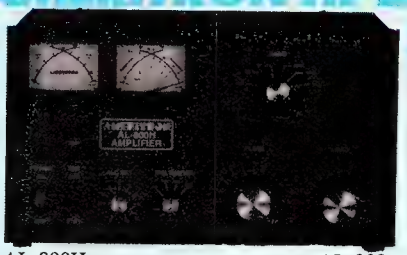

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Two tubes
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Ameritron's most powerful Amplifier

AL-1500 *with Eimac® 8877 ceramic tube*
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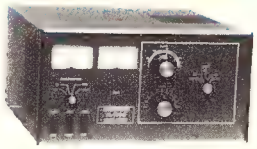
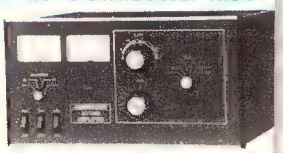
Suggested Retail



Ameritron's *most powerful* amplifier uses the herculean Eimac® 8877 ceramic tube. It's so powerful that 65 watts drive gives you the full legal output -- and it's just loafing because the power supply is capable of 2500 Watts PEP.

Ameritron's toughest legal limit Amp

AL-1200 *with Eimac® 3CX1200A7 tube*
$2295
Suggested Retail



Get ham radio's *toughest* tube with the Ameritron AL-1200 -- the Eimac 3CX1200A7. It has a 50 watt control grid dissipation. What makes the Ameritron AL-1200 stand out from other legal limit amplifiers? The answer: A super heavy duty power supply that loafs at full legal power -- it can deliver the power of more than 2500 watts PEP two tone output for a half hour.

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DC Currents

By Steve Mansfield, N1MZA
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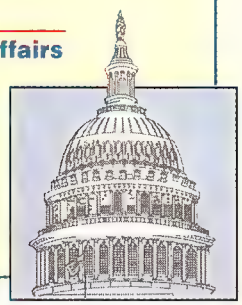


Just as radio waves aren't constrained by artificial boundaries, neither is ARRL's government relations effort. "DC Currents" covers behind-the-scenes activity you need to know about in Congress, at the FCC and other regulatory agencies, as well as at worldwide bodies such as the International Telecommunication Union.

Wireless Privacy Bill Passes House, Hits Senate

• In a resounding 414 to 1 floor vote (with 15 abstentions) HR.2369, the Wireless Privacy Enhancement Act of 1998 passed the US House of Representatives in March and now awaits action in the Senate. The bill that passed the House included a report specifically addressing the unresolved concerns that the ARRL raised with House Telecommunications Subcommittee staff. The House had earlier passed HR.2460, the so-called "anti cloning" bill, by a similar margin.

When the Tauzin bill was first introduced, the ARRL feared that it unintentionally could have outlawed all out-of-band amateur operations including MARS and Civil Air Patrol, as well as some scanning and short wave listening. These fears, which were also voiced by scanner enthusiasts, volunteer fire departments and others, were addressed by the bill's sponsor, Representative Billy Tauzin (R-LA-3rd), when the bill was amended during markup (see "DC Currents", December 1997). However, we continued to be concerned that certain provisions in the bill could be interpreted as forbidding the modification of linear amplifiers for 10 and 12 meter operations, as well as forbidding the modification of transceivers for use with MARS and Civil Air Patrol frequencies.

In the days before the bill went to the floor, subcommittee staff worked with ARRL and with other involved parties to craft a committee report that would put our fears to rest. Committee reports are the official statement of "Congressional intent" on important legislation. The House voted on the bill and the report as a single package.

The report said, in part:

"The Committee does not intend to prohibit amateurs from modifying linear amplifiers after purchase, as permitted by Commission rules, to allow the devices to operate in the amateur 12-meter and 10-meter bands. Nor does the Committee intend for Section 2(a) to prohibit amateurs from building or modifying one amplifier per year to enable this capacity...the Committee does not intend for Section 2 to be interpreted in a manner that would permit the Commission to take actions against an amateur operator who is operating within the terms of his or her license.

"Nor does the committee intend for Section 2(a) to be interpreted in a manner that would discourage manufacturers or dealers of amateur equipment from providing amateur licensees with information about permissible modifications of transceivers to enable them to transmit and receive on Military Affiliate Radio Service and the Civil Air Patrol, to the extent such transmission and reception is permissible under 18 U.S.C. 2511(g) or other statutes. The Committee expects that the new regulations required under Section 2 will preserve the ability of amateurs to modify transceivers for the legitimate purposes discussed above."

The report also clarified other concerns raised by scanner enthusiasts, short wave listeners and manufacturers. The full text can be found on the net at **ftp://ftp.loc.gov/pub/thomas/cp105/hr425.txt**.

Lest anyone doubt that members of Congress were trying to avoid inadvertently pounding on Amateur Radio as they hammered out this bill, consider the following colloquy between Representative Cliff Stearns (R-FL-6th) and Representative Tauzin that appeared in the *Congressional Record*:

"As my colleagues know, my home state of Florida is slightly susceptible to natural disasters" Stearns said, "and we are just now beginning to recover from the horrific tornado-driven storms from the past weekend. Without the aid of the amateur radio operators, Florida would suffer more during these disasters. The operators perform an invaluable service in helping coordinate disaster assistance." Stearns went on to thank his home state volunteers, as well as the members who helped with the bill. Tauzin responded, "...I wanted to take a minute to compliment the gentleman from Florida and his efforts at our subcommittee level indeed to make sure our bill did not interfere with the rights of...the amateur radio operators who do assist dramatically in times of natural disaster. My home state of Louisiana, as he knows, was visited by Andrew as his was just a few years ago. We have a desperate need for those services."

There is no word on what the Senate plans to do about this legislation.

As readers of this column will remember, when it was originally introduced, HR.2369 provoked an outcry from radio amateurs, scanner enthusiasts, the volunteer fire community and others. The catalyst had been a highly publicized 1996 cellular telephone eavesdropping case involving House Speaker Newt Gingrich (R-GA-6th), Majority Leader Dick Armey (R-TX-26th) and Republican Conference Chairman John Boehner (R-OH-8th). The three Republican leaders were discussing GOP campaign strategy when Boehner's cellular signal was taped by a Florida couple, and the contents of the tape were disclosed to the news media by Representative Jim McDermott (D-WA-7th) who was serving on the House Ethics Committee at the time. Boehner has since sued McDermott in US District Court for $30,000, unspecified punitive damages and court costs in the case. The Florida couple last year pleaded guilty to illegal interception of a cellular telephone call and paid $500 fines.

Ham Special to the Orlando Sentinel

♦ Norman Lauterette, WA4H, made sure credit was given where credit was due in the *Orlando Sentinel* when he drafted an article about the Amateur Radio Emergency Service (ARES) contribution in the aftermath of February's severe tornadoes in central Florida. "It was my job, along with other operators," said Norman, "to monitor the storm and give pinpoint reports. When there's no telephone service and wires are down, we're the source."

Next Round of WRC Preparations Begins

♦ We may not know precisely when the next World Radiocommunication Conference will be held—in 1999 or in 2000—but preparatory work is already well underway. ARRL Technical Relations Manager Paul Rinaldo, W4RI, has just returned from four weeks in Geneva. There, he represented the ARRL on US delegations to several ITU Radiocommunication Sector (ITU-R) meetings.

ITU-R Working Party (WP) 7C met February 23-27. This group is responsible for studies relating to the Earth Exploration Satellite Service (Active) that is eyeing the band 430-440 MHz for Synthetic Aperture Radars (SARs). WP 7D, which is responsible for Study Group 7 (Science Services) preparations for WRC-99, met February 26-March 7.

Joint Rapporteur Group (JRG) 8A/9B met March 11. This group is looking at issues relating to "fixed wireless access" (FWA, sometimes called "wireless local loop") and is made up of participants involved in the mobile and amateur services and the fixed service. FWA is one of the "hot" fields of wireless telecommunications development. FWA proponents are considering the suitability of more than 100 frequency bands between 27 MHz and 66 GHz, some of which, of course, involve amateur bands.

WP 8A met March 12-18. This Working Party is our principal "home" in the ITU, as it is responsible for both the amateur and the amateur-satellite services.

Ken Pulfer, VE3PU, represented the International Amateur Radio Union (IARU) at the meetings of WP 7C and 7D. ARRL International Affairs Vice President Larry Price, W4RA, represented the IARU at the meetings of JRG 8A/9B and WP 8A.

In WP 7C and 7D, Ken Pulfer introduced an IARU paper documenting our sharing concerns with regard to the 420-450 MHz band. A US paper authored by the ARRL was also introduced, expanding on the theme and reviewing the status of technical sharing studies that have been performed based on what we have been told of the characteristics of SARs. As preparations proceed toward WRC-99, this theme will have to be further expanded with the results of additional technical studies.

In WP 8A, Dr. Price introduced an IARU paper describing progress in HF data communications in the amateur service and setting out the characteristics of PACTOR I, CLOVER, G-TOR, and PACTOR II. This paper may eventually lead to an ITU-R Recommendation; even if it doesn't, it is useful to promote the fact that Amateur Radio is not standing still with respect to HF techniques. Dr. Price also introduced the paper in WP 8B (maritime, aeronautical, and radiodetermination services), which met March 16-27, where it was accepted as information of interest to the maritime service. Also in WP 8A, several ARRL-authored US papers updating existing documentation relating to our services were introduced. The groundwork was also laid in WP 8A for the eventual reinforcement of our position with regard to 420-MHz EESS.

Gray Lady Sings Amateur Radio Praise

• On March 5 *The New York Times* (the so-called "Gray Lady" of journalism) noted that Amateur Radio is "still thriving, still evolving and still captivating," and said that "a new, digitally hip generation is sweeping into ham radio..." The article quotes Keith Baker, KB1SF, on how he uses Internet e-mail and amateur satellites to communicate in a sort of "Version 2.0" of Amateur Radio. Baker is executive vice president of AMSAT. The half-page article also quoted Dewayne Hendricks, WA8DZP, of Fremont, CA; Brad Thomas, KC1EX, *QST* Advertising Manager; and Geoffrey Baehr, N6LXA, of Mountain View, California. ARRL Media Relations Assistant Jennifer Gagne, N1TDY, worked with John Verity, the author of the piece in developing his news sources. PR pros have long known the importance of getting favorable coverage by the Gray Lady. *The New York Times* is the "newspaper of record" for American journalism, so when a story appears there, it is automatically news for journalists all over America and followup stories are likely to appear.

Low Power Gets High Profile

♦ Low power "microradio" got a bit of a power boost recently when FCC Chairman William Kennard implied in a letter to the editors at *USA Today* that the proposed 1 W community based low-power AM and FM broadcasting service might be an answer to the growing problem of "radio pirates" who broadcast illegally on commercial radio frequencies.

Radio piracy has been a growing issue among broadcasters as high profile unlicensed broadcasters, so called "radio pirates" equipped with small homebuilt radio stations, take to the air. In most cases they broadcast their own version of news and entertainment to the community on commercial radio frequencies. The pirates claim that commercial radio is dominated by huge economic interests that are insensitive to local concerns.

The National Association of Broadcasters has been pressuring the FCC and Congress to do something about what they perceive to be a growing problem. Supporters of pirate radio contend that current telecommunications laws and regulations effectively prevent all but the most wealthy and powerful from obtaining radio licenses.

The concept of microradio was proposed to the FCC in at least two separate Petitions for Rulemaking. One, RM 9208, filed by Reston, Virginia ham Nickolaus Leggett, N3NL, and his wife Judith Leggett, would create a class of licensees who could operate legally at low power on a single broadcast frequency within local communities. By restricting the service to low power stations, signals in coverage areas among neighboring communities would not interfere with one another. Should the concept gather momentum at the FCC, power restrictions, antenna heights and other such factors will likely become major topics of debate.

Leggett's petition says the service would "provide direct opportunity for citizen involvement in broadcasting." The petition suggests that "new musical groups could present their product to society and new social and political options could be discussed. Specialized stations would arise addressing specific subjects and activities such as golfing, flying, energy conservation, ecology, animal rights, etc."

Leggett notes in his comments on the rulemaking that possible participants in the microbroadcasting concept are extremely independent minded individuals. "Even the collectivists are individualists!" he says. Generally speaking, mainstream broadcasters are not enthusiastic.

Congressional Probe of FCC Heats Up

♦ Beginning last March and continuing through June, the FCC will be under the microscope on Capitol Hill as both the House and Senate hold a series of hearings to investigate the FCC's performance. The House Commerce Committee has already explored cellular privacy, satellite competition, as well as Internet pornography. The committee will shortly be turning its attention to computer security and Internet encryption issues. The Senate Commerce Committee has been focussing more on common-carrier issues, with hearings scheduled on cable television, 911 access by cellular providers, 800 numbers, telephone rates and similar issues. The Senate will launch a series of oversight hearings, bureau-by-bureau, in May and June.

Helping to keep the FCC and Congress from kissing and making up are unresolved and highly controversial issues. These include free airtime for political candidates and what is perceived by some members of Congress as the FCC's tardiness in fully implementing the Telecommunications Act of 1996. Meanwhile, the US Justice Department has launched an investigation into possible criminal misconduct behind some aspects of the FCC's move to the new Portals office building in downtown Washington.

2m/70cm Mobiles **FT-2500M/FT-7400H**

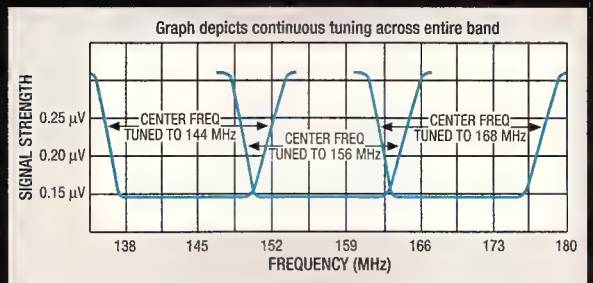
Advanced Track Tuning, Mil Spec, true FM. All in one radio!

Outside, you can easily see why the FT-2500M stands up to the shock and vibration like no other. We engineered the first mobile radio to meet the rigid standards set by the U.S. Military back in the '80s, and that same critical design is in the FT-2500M. From the simplified front panel, rubber coated knobs, durable pebbled finish coating, and huge Omni-Glow™ display to the one-piece die-cast chassis, the FT-2500M can take whatever you throw at it!

Inside, the electrical circuitry meets standards so uncompromising the FT-2500M can respond like no other radio. Built-in 3-Stage Advance Track Tuning (ATT), automatically retunes from 140 to 174 MHz permitting consistent receiver sensitivity across the entire band.

But there's more. Like alpha-numeric display capability! Lets you program a frequency or a 4-character name on any of the 31 memories. With three selectable power output levels and up to 50 watt power output, the FT-2500M extra large heat sink means forced air cooling is not necessary. And, as a bonus, Yaesu's exclusive backlit DTMF mic comes with every FT-2500M.

Experts say the FT-2500M is the only commercial-grade amateur radio available. So, for tough manufacturing standards, inside and out, with true FM clarity, and outstanding performance, the FT-2500M is your mobile.



3-Stage Advance Track Tuning (ATT) – The exclusive 3-Stage Advance Track tuning front end automatically adjusts band width sensitivity across the entire receiver range, while maintaining selectivity specifications. ATT significantly reduces interference from inter-modulation and front end overload.

Specifications

- **Frequency Coverage:**
  FT-2500M
  RX: 140-174 MHz
  TX: 144-148 MHz
  FT-7400H
  RX/TX: 430-450 MHz
- Rugged Military Spec Design
- Advanced Track Tuning (ATT)
- Selectable Alpha-Numeric Display
- Omni-Glow™ Display, largest available
- Power Output:
  FT-2500M 50/20/5 Watts
  FT-7400H 35/15/5 Watts
- Flip Up Front Control Panel hides seldom used buttons
- Backlit DTMF Mic
- 31 Memory Channels
- CTCSS Encode Built-in
- Automatic Power Off (APO)*
- Time-Out Timer (TOT)*
- Manual* or Automatic Backlighting Adjustment
- **Accessories:**

FP-800	20 Amp HD Power Supply w/ Front Mounted Speaker
FRC-6	DTMF Paging Unit
FTS-17A	CTCSS Decode Unit
SP-4	External Mobile Speaker w/ Audio Filters

*FT-2500M

YAESU

Performance without compromise.℠

"Just look inside. Military spec really means something to Yaesu!"

"A QST review says 'the FT-2500M exhibited superior 10 MHz offset IMD dynamic range of 103 db!'"

"This Advanced Track Tuning practically eliminates intermod!"

"Yaesu did it again."

US MILITARY APPROVED MIL-SPEC 810

FT-3000M

High-Powered 2-m FM Transceiver
Feature-rich, 70 full watts of TX power, and built to the tough performance standards you've come to expect from Yaesu.
FEATURES • Frequency Coverage Wide Band Receive-- RX:110-180 MHz, 300-520 MHz, 800-999 MHz* TX:144-148 MHz • AM Aircraft Receive • MIL-STD 810 Rating • Interactive Programming • High Power Output: 70 Watts, plus 50, 25 and 10 Watts • Quick-Touch™ Dual Concentric Control Knob • Twin Cooling Fans • ADMS-2 Windows™ Programmable • Digital Coded Squelch (DCS) • 81 Memory Channels • Auto Range Transpond System™ (ARTS™) • 1200/9600 Baud Packet Compatible • Smart-Search™ • Alphanumeric Display • Dual Watch • Full line of accessories
*800 MHz Cellular blocked

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Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

Ultra Compact Dual Band Handheld **FT-50RD**

One tough little dual bander!

Features

- Frequency Coverage
  Wide Band Receive
  RX: 76-200 MHz, 300-540 MHz, 590-999 MHz*
  TX: 144-148 MHz, 430-450 MHz
- AM Aircraft Receive
- MIL-STD 810 Rating
- Digital Coded Squelch (DCS)
- 112 Memory Channels
- 12V DC Direct Input
- High Speed Scanning
- Alphanumeric Display
- CTCSS Encode/Decode
- Auto Range Transpond System™ (ARTS™)
- Dual Watch
- Direct FM
- High Audio Output
- ADMS-1C Windows™ PC Programmable
- Four Battery Savers:
  Automatic Power-Off (APO)
  Receive Battery Saver (RBS)
  Selectable Power Output (SPO)
  Transmit Battery Saver (TBS)
- Time Out Timer (TOT)
- 2.5 and 5 Watt Versions Available
- Built-in Digital Voice Recording System (DVRS)
- Full line of accessories

NOW WITH BUILT-IN DELUXE KEYPAD

"You notice how loud this HT's audio is?"

"Yeah, it's Mil Spec tough like a commercial HT."

"Easy to operate, small, great price!"

"Yaesu did it again!"

US MILITARY APPROVED MIL-SPEC 810

The foremost in top-performing, durable, dual band handhelds now includes the FTT-12 DTMF keypad with CTCSS enc/dec, DCS enc/dec, DVRS and paging/coded squelch. Manufactured to rigid commercial grade standards, the FT-50RD is the only amateur dual band HT to achieve a MIL-STD 810 rating. Already a winner; the deluxe keypad makes this stand-out HT even better! Water-resistant construction uses weather-proof gaskets to seal major internal components against the corrosive action of dust and moisture. And, the rugged FT-50RD withstands shock and vibration, so throw it in with your gear!

Exclusive features set the FT-50RD apart, too. Wide Band Receive includes 76-200 MHz (VHF), 300-540 (UHF), and 590-999 MHz*. Dual Watch checks sub-band activity while receiving on another frequency, then when a signal is detected, shifts operation to that frequency. Digital Battery Voltage displays current operating battery voltage. Digital Coded Squelch (DCS) silently monitors busy channels. Auto Range Transpond System™ (ARTS™) uses DCS to allow two radios to track one another. And, the FT-50RD is ADMS-1C Windows™ PC programming compatible, too. To round out the FT-50RD, it has four battery savers, and super loud audio—remarkable in an HT this size.

A reliable companion where ever you go, the FT-50RD is one tough little dual bander with all the features you want!

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FT-10/40R
Ultra Compact Handhelds
VHF or UHF. Similar to FT-50RD including MIL-STD 810, and other exclusive features.

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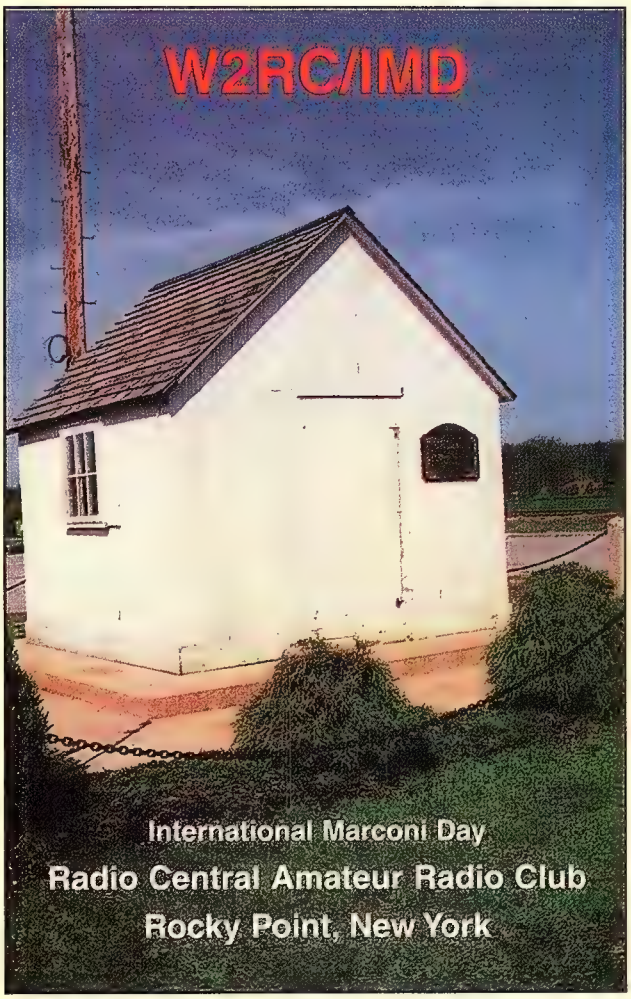
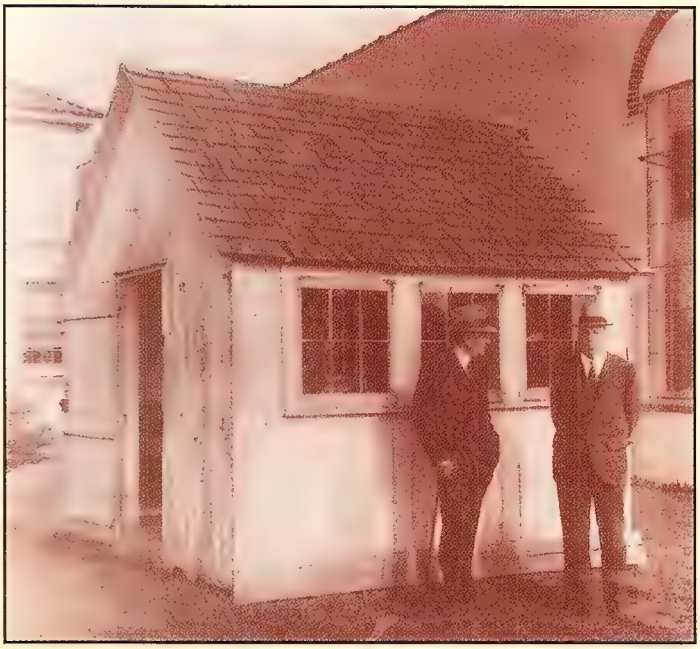
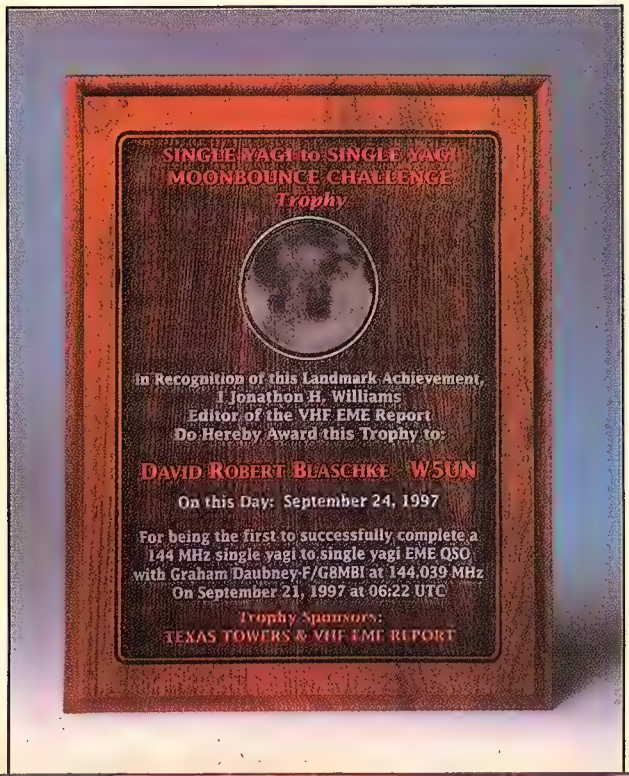
Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details. *Cellular blocked





International Marconi Day. Guglielmo Marconi conducted the first ship-to-shore communication in the US from a tiny shack in Babylon, New York. Edwin Armstrong, the father of FM, bought the shack and later gave it to the RCA Company, who moved it to Rocky Point, New York. The shack is shown above circa 1930 with Marconi (left) and Armstrong (right). The shack found its way into the hands of the Rocky Point School system in 1971. In 1987 the Eric Trojahn Memorial Radio Club (N2HNZ) made the first transmissions from the shack since the days of Marconi.

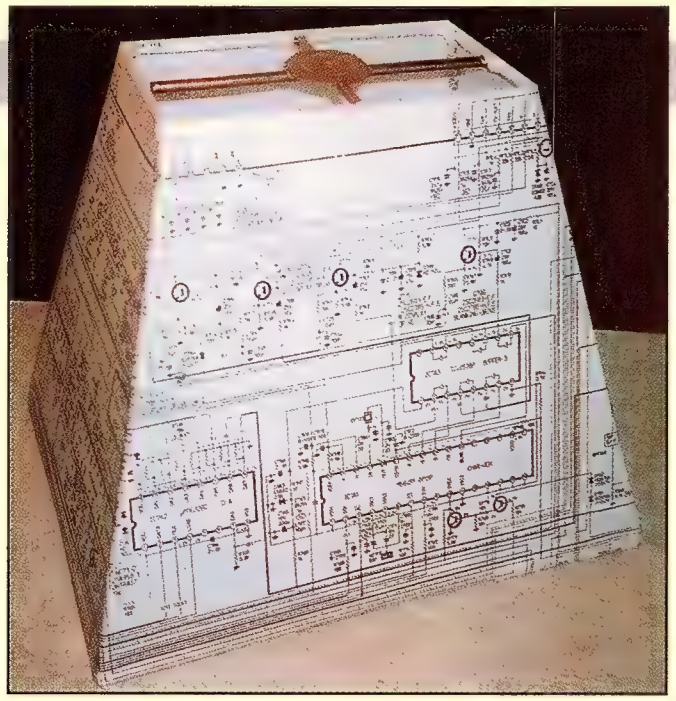
On April 25, the shack will once again reverberate with the sounds of radio when the Radio Central Amateur Radio Club operates W2RC/IMD, their special-event station to commemorate International Marconi Day. Everyone who contacts the station will be eligible to receive the colorful QSL shown here. See "Special Events" in last month's *QST* for details.

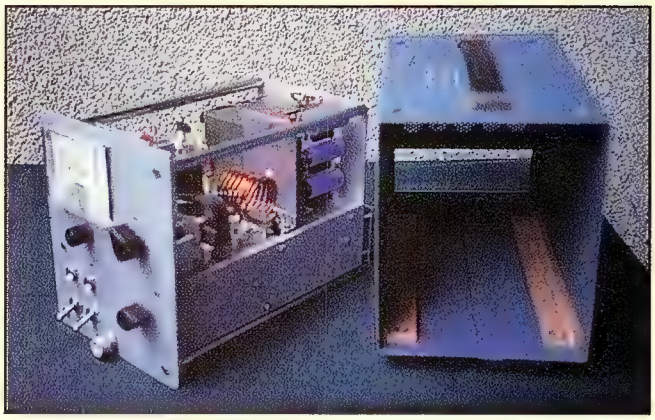

SINGLE YAGI to SINGLE YAGI
MOONBOUNCE CHALLENGE
Trophy
In Recognition of this Landmark Achievement,
I Jonathon H. Williams
Editor of the VHF EME Report
Do Hereby Award this Trophy to:
DAVID ROBERT BLASCHKE W5UN
On this Day: September 24, 1997
For being the first to successfully complete a
144 MHz single yagi to single yagi EME QSO
with Graham Daubney F/G8MBI at 144.039 MHz
On September 21, 1997 at 06:22 UTC
Trophy Sponsors:
TEXAS TOWERS & VHF EME REPORT

The first single-Yagi-to-single-Yagi moonbounce contact! For decades hams have been enjoying VHF, UHF and microwave DX by bouncing their signals off the surface of the Moon. But when most of us think of moonbounce (EME) stations, we conjure images of gigantic, expensive antenna arrays. While it's true that the top moonbouncers use big antennas (and big power!), recent advances in technology are bringing this mode within reach of less financially endowed hams.

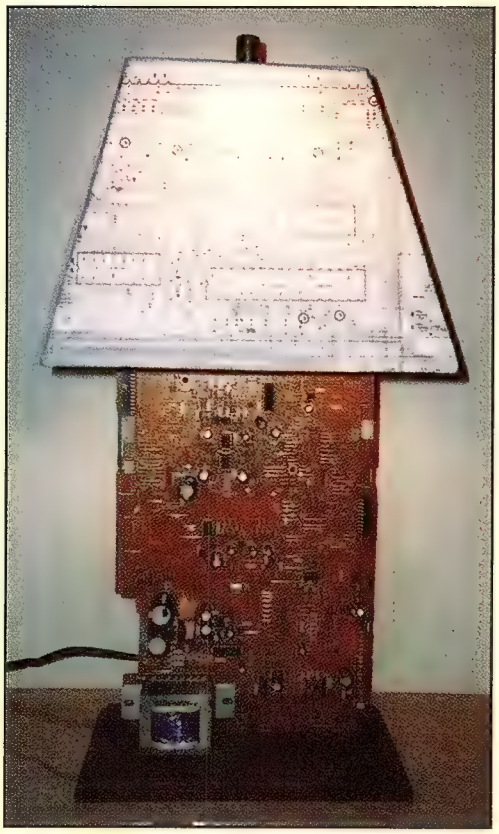
Jonathon Williams, WB6IMC, editor of the *VHF EME Report*, was well aware of this situation, and wanted to spur activity on the bands above 50 MHz. To prove that moonbounce was possible "for the rest of us," he recruited a sponsorship from Texas Towers and issued a challenge: He would award two trophies—one of which is shown here—to the hams who made the first verified moonbounce contact using only single Yagi antennas at both ends of the path.

On September 21, 1997, Dave Blaschke, W5UN, and Graham Daubney, F/G8MBI, succeeded by making a 2-meter moonbounce contact using long-boom Yagi antennas. (You'll find more details in "The World Above 50 MHz", December 1997 *QST*, page 89.) Congratulations to Dave and Graham on this historic "first"!



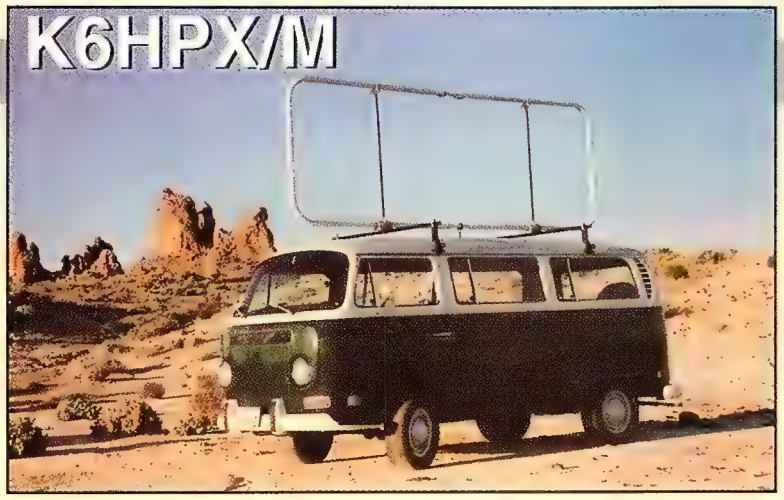


Homebrew "boots". Jorge Dorvier, EA4EO, enjoys operating QRP, but there are times when he needs to give his 5-W rig a boost. He grabbed a scrap Tektronix oscilloscope case and used it to house an 18 to 28 MHz RF amplifier of his own design. The amp features a broadband grid-input circuit and a single 6164 tube. Jorge enjoys close to 100 W output with his creation, but only when necessary!



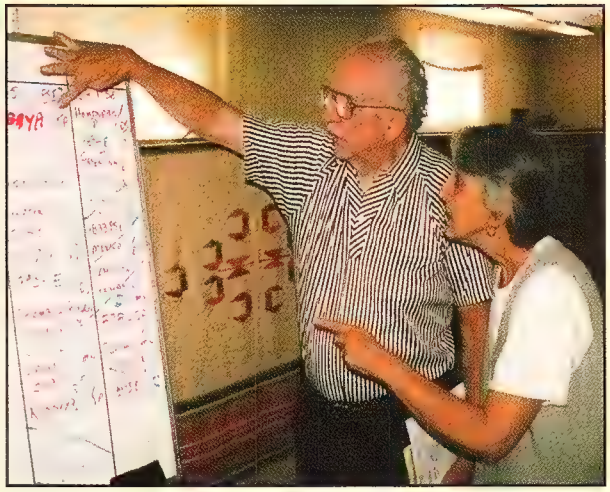
How's this for a bright idea? What do you do with a discarded printed-circuit board from a Sony CD player? You make a desk lamp out of it! Charles Haist, W6TWL, mounted the circuit board onto a walnut base and topped it with a shade crafted from a schematic diagram that used to accompany a TV set. The lamp is controlled through a Radio Shack touch switch—the first touch gives a dim night-light glow; the second touch is medium illumination and the third touch brings the lamp up to "full power."

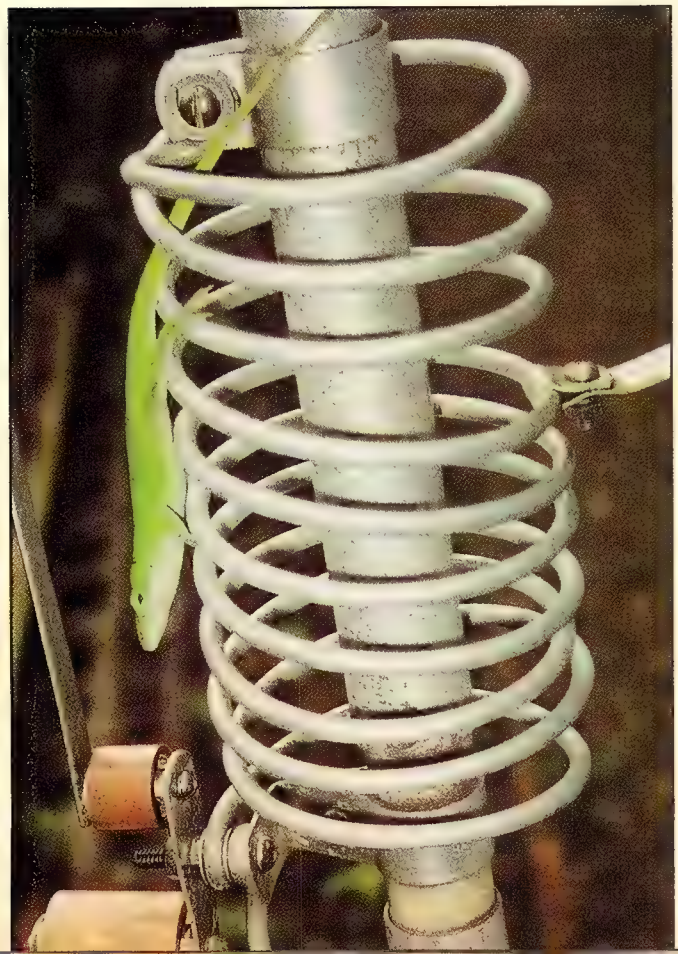
Contest cognoscenti. N2AA's 60th birthday party last November attracted a rare gathering of Amateur Radio contest celebrities. Front row: Doug Zwiebel, KR2Q; Gene Walsh, N2AA—the guest of honor; Bill Schneider, K2TT. Second row: Trey Garlough, N5KO; Andy Blank, N2NT. Third row: Doug Grant, K1DG; John Dorr, K1AR. Fourth row: Bob Moore, N2RM; Sal Anastasio, WM2H; John Golomb, N2NC. Back row: Gene Zimmerman, W3ZZ; Tom Wall, K2TW; Bob Naumann, N5NJ.



Antenna? What antenna? Ken Hirschberg, K6HPX, restored a 1970 Volkswagen van, but he couldn't leave well enough alone. Instead, he installed this gigantic 4 × 12-foot loop antenna for his HF mobile adventures. (For this QSL photo the van was parked at the Trona Pinnacles, near Death Valley, California.) Ken says the antenna design plans are available, "... for anyone needing a quick divorce!"

For the kids of Kaloleni. Another shipment of medical equipment and supplies has arrived in Nairobi, Kenya. Its final destination is St Luke's Hospital in the village of Kaloleni. The shipment contains many high-priority items sent by MediShare-Bush Hospital Foundation International. The "needs" list was communicated via radio to MARCO (Medical Amateur Radio Council) members. Most of the shipment was donated by Direct Relief International of Santa Barbara, California, but a portion was also provided by MARCO members Drs Jerry Hofkin, KB3AP, and Dean Jeutter, K3GGN. In the accompanying photo, Dr Robert C. Smithwick, W6JZU (left), and Katherine Poma (with Direct Relief International) discuss the status of shipments to Kenya. To learn more about MARCO and MediShare, see "MediShare International" by Tom McShane, NW6P, in the February 1997 *QST*, page 41.





Neptune's Wouff Hong. Jack Najork,W5FG, discovered this odd bit of coral while beachcombing on the Seychelle Islands. Now we know what inspired The Old Man to create his original instrument of punishment for bad operators!

A visitor of the reptilian variety stopped by WB6FZH/KH6 at Kaneohe Bay, Oahu, Hawaii to inspect Greg Greenwood's Butternut vertical antenna. It's fortunate for the lizard that Greg operates QRP most of the time!

DIAMOND ANTENNAS—
THE STANDARD BY WHICH ALL OTHERS ARE JUDGED

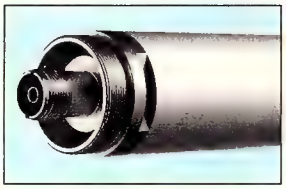
Acclaimed as the technological leader in single & multiband antennas

• Wide-band Performance • Factory Adjusted–No Tuning Required • Highest Gain
• UPS Shippable • High Wind Rating • Fiberglass Radome • DC Grounded • Stainless Hardware

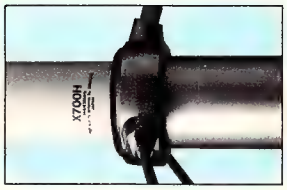
See us at Dayton Booth 366.

X500HNA

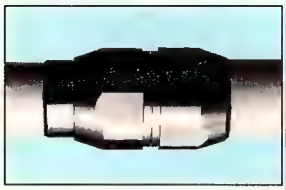
RUGGEDIZED BASE/REPEATER ANTENNA



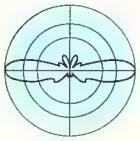
COAX CONNECTION AT BASE END



HEAVY DUTY BASE/ RADIAL ASSEMBLY



STRONG JOINT COUPLINGS



147MHz

445MHz

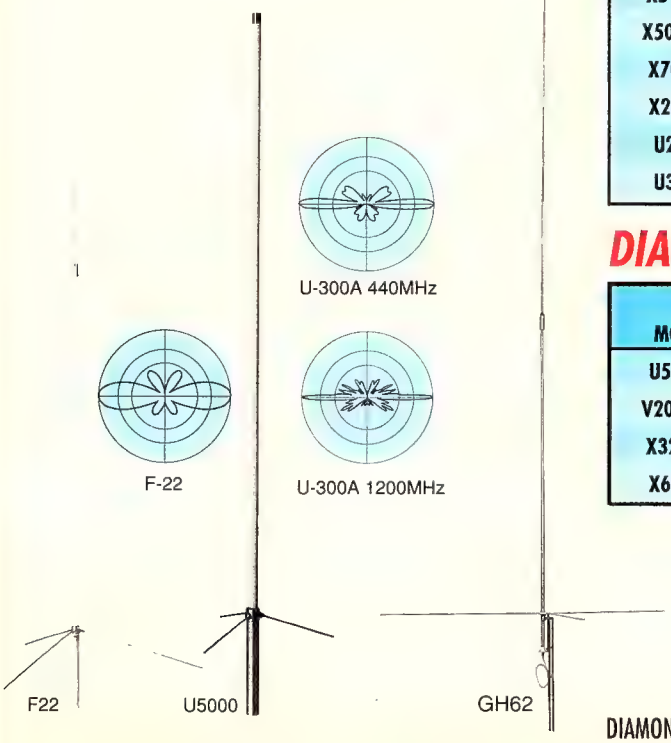
Radiation patterns for X500HNA/X510MA/X510NA

X510

U-300A 440MHz

F-22

U-300A 1200MHz



F22 U5000 GH62

DIAMOND Mono-band Base/Repeater Antennas

MODEL	BAND (MHz)	GAIN (dBd.)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No Ice)
DPGH62[1]	50		200	UHF	21.0	78
F22A	144		200	UHF	10.5	112
F23A	144		200	UHF	15.0	90
F142A	222		200	UHF	6.0	110
F718A[2]	440		250	N	15.0	110
F1230A	1240		100	N	10.5	90

DIAMOND Dual-Band Base/Repeater Antennas

MODEL	BAND (MHz)	GAIN (dBd.)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No Ice)
X50A	144/440		200	UHF	5.6	135
X200A	144/440		200	UHF	8.3	112
X300A	144/440		200	UHF	10.2	112
X510NA[3]	144/440		200	N	17.2	90
X510MA	144/440		200	UHF	17.0	90
X500HNA	144/440		200	N	17.8	90+
X700HA	144/440		200	UHF	24.0	90
X2200A	144/222		150	UHF	11.5	112
U200A	440/1240		100	N	5.9	135
U300A	440/1240		100	N	8.3	110

DIAMOND Tri-Band Base/Repeater Antennas

MODEL	BAND (MHz)	GAIN (dBd.)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No Ice)
U5000A	144/440/1240		100	N	5.9	135
V2000A[1,4]	50/144/440		150	UHF	8.3	110
X3200A[5]	144/222/440		100/200	UHF	10.5	112
X6000A	144/440/1240		100/100/60	N	10.5	112

BAND: 144=144-148MHz., 222=222-225MHz., 420=420-430MHz. 430=430-440MHz., 440=440-450MHz., 1240=1240-1300MHz.

Mast requirement: 1.4"-2.4

[1] 50 MHz antennas are adjustable
[2] F-718A: 440-450MHz., F-718J: 430-440MHz., F718L: 420-430MHz.
[3] X510NJ: 144-147/430-440MHz.
[4] 1/4λ rated in dBi.
[5] 2m: 146-148

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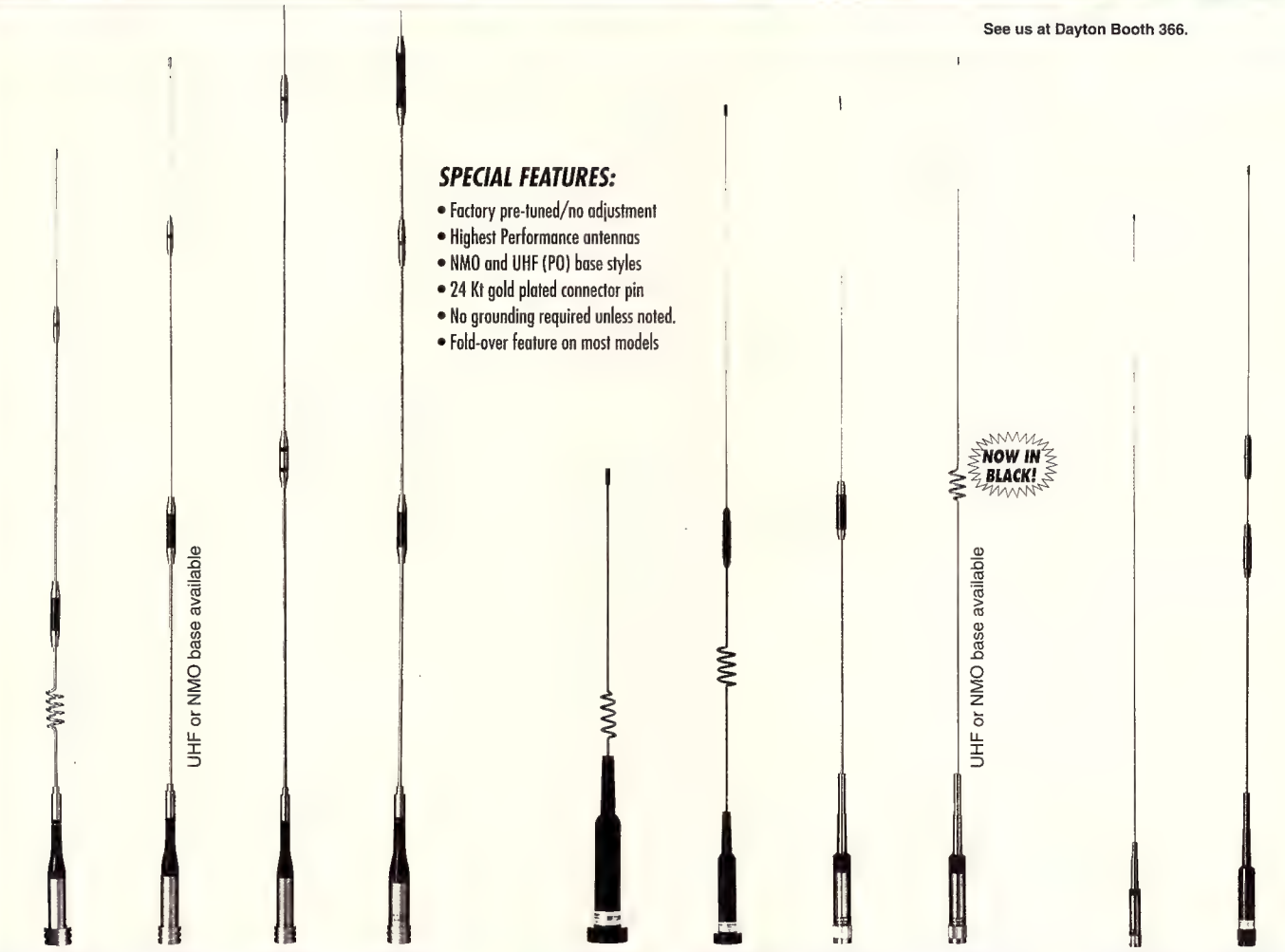

SG7200NMO | SG7500 SG7500NMO | SG2000 | SG7900 | NR72BNMO | NR73BNMO | NR770R | NR770H NR770HB | CR214S | CR320A

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MODEL	BAND	GAIN (dBd.)	WATTS	CONN.	HT. IN.	ELEMENT PHASING
NR72BNMO[6]	2m/70cm		100	NMO	13.8	1/4λ, 1/2λ
NR73BNMO	2m/70cm		100	NMO	33.5	1/2λ, 1-5/8λ
NR770SA[6]	2m/70cm		100	UHF	16.9	1/4λ, 1/2λ
NR770HA[7]	2m/70cm		200	UHF	40.2	1/2λ, 2-5/8λ
NR770HNMO[8]	2m/70cm		200	NMO	38.2	1/2λ, 2-5/8λ
NR770RA	2m/70cm		200	UHF	38.6	1/2λ, 2-5/8λ
NR790A*	2m/70cm		120	UHF	57.5	6/8λ, 3-5/8λ
SG7000[6]	2m/70cm		100	UHF	18.5	1/4λ, 6/8λ
SG7200NMO	2m/70cm		150	NMO	36.6	1/2λ, 2-5/8λ
SG7500A	2m/70cm		150	UHF	40.6	1/2λ, 2-5/8λ
SG7500NMO	2m/70cm		150	NMO	41.0	1/2λ, 2-5/8λ

1/4λ antennas rated in dBi.

MODEL	BAND	GAIN (dBd.)	WATTS	CONN.	HT. IN.	ELEMENT PHASING
SG7900*	2m/70cm		150	UHF	62.2	7/8λ, 3-5/8λ
SG2000*	2m		150	UHF	62.6	7/8λ
SG6000NMO[6,9]	6m		150	NMO	39	1/4λ
NR140A	1-1/4m		100	UHF	36.2	5/8λ
NR124	23cm		100	N	25	4-5/8λ
CR214S[6]	2m/1-1/4m		120	UHF	37	1/2λ, 5/8λ
CR224A*[6]	2m/1-1/4m		150	UHF	68.5	7/8λ, 2-5/8λ
CR320A[6]	2m/1-1/4m/ 70cm		200/ 200/100	UHF	37.4	1/4λ, 1/2λ, 2-5/8λ
CR627B[6,9] CR627BNMO[6,9]	6m/2m/ 70cm		120 200/100	UHF NMO	60	1/4λ, 1/2+1/4λ/ 2-5/8λ
NR2000NA	2m/70cm/ 23cm		100	N	39	1/2λ, 2-5/8λ 5-5/8λ

* Not recommended for Magnet Mount
[6] Grounding required.
[7] NR770HB same specifications but in black finish.
[8] NR770HBNMO same specifications but in black finish.
[9] 50MHz antennas adjustable

FOLD-OVER

Patented One-Touch Fold-over Feature
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RADIO RAGE

I am retired and I've recently rejoined Amateur Radio after a 30-year hiatus. When I started in the hobby I was a young physician and I was only able to enjoy ham radio for about seven years before I was forced to surrender to the pressures of emergency calls, delivering babies and so on. There weren't enough free hours in the day to keep my station on the air.

What a change 30 years can make! As I studied for my tests I was astonished at the new technologies and regulations. Computers have become as commonplace in modern ham shacks as soldering irons. The codeless Technician license and the whole Volunteer Examiner program have opened new vistas that didn't exist when I was first licensed.

In the midst of all these positive changes at least one negative development has taken place while I've been away. I call it "radio rage."

I've returned to airwaves populated with some extremely angry individuals. It isn't uncommon to hear foul language, poor manners and worse. Racism and xenophobia are rampant.

How did this come about in 30 years? Getting your ham license back then was like taking a solemn oath. We tacitly pledged ourselves to fraternal values and service to our communities. Behavior such as I witness today was virtually nonexistent in that sort of environment.

It should be apparent to anyone that we're going to have a difficult time justifying our occupation of valuable spectrum if this type of activity is allowed to continue. I know the ARRL Directors are responding to the problem as best they can, but ultimately it comes down to the old concept of "self policing." If we do not do this ourselves, it will be done *to* us and *for* us. Trust me, if the heavy hand of the federal government is forced to intervene, you won't enjoy the consequences.—*Dr Roy Overton, MD, KØWNR, Des Moines, Iowa*

ONE MAN'S PIRATE IS ANOTHER MAN'S COMMUNITY RADIO

After reading "Another Look at FCC Enforcement" in the March *QST* ("DC Currents", page 16), I would like to point out a big difference between Amateur Radio and other services—mainly broadcast radio. The National Association of Broadcasters has been howling about all the so-called "pirate" stations showing up on the AM and FM broadcast bands. I submit that commercial broadcasters have brought the "pirate" problem on themselves with the 1996 Telecom Act. This Act effectively ended local broadcasting and community service, which were once the staples of radio and TV broadcasting in this country.

A few corporations now control almost every radio and TV station in the country and, in many cities, they have a virtual monopoly in radio. For example, here in Atlanta one company (Cox) owns the newspaper, the ABC TV affiliate and several radio stations. My feeling is that many of the "pirates" in the broadcast bands are only filling voids left after the Telecom Act did away with community based radio. I do not have a problem with them so long as they are not interfering with other broadcasts.

On the other hand, Amateur Radio is still a community based radio service and will remain so as long as big corporations don't get their hands on our frequencies which, as we all know, they'd like to do. If the day should ever come that amateur frequencies are auctioned off to the highest corporate bidders, I too will become a "pirate." We have invested much in our equipment and hobby—too much to give it away to anybody. I hope that day never arrives, which is why I joined the ARRL. But if it does, my mike will not go silent!—*Kevin Kitchen, N9PBW, Atlanta, Georgia*

MOBILE DANGERS

For 11 years I had a 2-meter rig mounted on the instrument panel of my car, just above my right leg. The bottom of the radio was roughly parallel to my leg when driving, not at right angles to it.

I never thought my installation could possibly pose a danger until the day I suffered a seizure just three blocks from home. According to witnesses I became completely catatonic, driving for almost three blocks in an unresponsive state until I finally veered off the road and struck a tree. The seatbelt was there to protect me, but my body reached the radio first. My conveniently mounted rig was a perfect fulcrum for snapping my right fibula (the smaller bone in the lower leg). As a result of the accident, my leg and foot are permanently swollen, but I consider myself lucky. I can still walk and I didn't kill anyone!

The moral of my story is this: Don't install a radio in a position between you and your car. Should an accident occur, you need room for your body to accelerate forward before it is stopped by the seatbelt or air bag. Don't put a radio in that space!

I'm amazed at hams who will spend hundreds or thousands of dollars for transceivers, only to mount them in their cars with the most flimsy arrangements you've ever seen! In a crash these rigs will resist rapidly moving bodies (like mine), or they'll become deadly flying objects.—*Dick Safirstein, W2DS, Clearwater, Florida*

RADIO AND THE *TITANIC*

As the latest movie version of the *Titanic* disaster sweeps through the theaters, it is interesting to note that radio and radio operators played a major role, both positively and negatively. As you'll see, some of the radio exchanges were sadly similar to what we hear on the bands today!

As the events of the fateful evening unfolded, *Titanic* radio operator Harold Phillips received several ice warnings from ships at sea and duly posted them to the bridge. Then he came within range of Cape Race, Newfoundland (call sign MCE) and a heavy exchange of traffic followed with many social and business messages going in both directions. He ignored several more ice warnings, even telling one operator from the nearby *Californian*, "Shut up! I am working Cape Race. You are interfering." (Sound familiar?) The *Californian* operator switched off his rig in anger and went to bed. The *Titanic* (call sign MGY) received another ice warning when they were just 25 miles from the iceberg that would sink them. Phillips acknowledged it, but didn't post the warning to the bridge.

As the ship was sinking, the *Californian* stopped dead in an ice field within visual range of the *Titanic*. Her captain, Captain Lord, did not respond to the first rocket. After seeing several more he awoke the radio operator and asked him to establish contact with whatever vessel was firing the rockets. It was too late; by then the *Titanic* had lost its radio capability. The *Californian* tried a Morse lamp, but it was not acknowledged. Soon the rockets stopped.

For whatever reason—best left to historians to argue—the *Californian* did not go to the scene. Had the angry radio exchange not taken place, the *Californian's* operator may have remained at his post and confirmed the *Titanic's* dire circumstances. The next closest ship was the *Carpathia*. She received the calls from the *Titanic*, but couldn't reach the area until nearly daybreak.

After the incident, with the radio operators taking their share of the blame, Gugliemo Marconi was praised for his wireless technology since it was reasoned that by virtue of hearing the SOS at some distance, the *Carpathia* was able to respond to effect a rescue.

Despite the unfortunate incident between the radio operators aboard the *Titanic* and *Californian* that night, and despite the occasional problems we hear on our bands today, we can be justifiably proud of radio's rich history of service. Whether professional or amateur, everyone involved in the emergency communication community should take pride in their accomplishments. May we continue to serve.—*Alan Lovitch, WB2IXS, Pompton Lakes, New Jersey*

MOVIN' ON UP

♦ My introduction to ham radio came from listening to a police scanner. I used my scanner to monitor SKYWARN nets and the police activity in our community. My dad, N3PBO, and my brother Pete, N8YEL, would talk on the local repeaters and I'd listen to them chat. Once in a while I would catch them talking about me and I'd have to call them on the phone and tell them to cut it out!

That situation couldn't last long. I finally studied and passed my Technician exam. I love using Amateur Radio to talk to my family. My son Eric, KC8JBL, is now part of our ham family, too.

You'd think the story might end there. I was a happy FM operator—until I got my hands on a used 10-meter transceiver. I had to participate in this "new world," so I passed my CW test and upgraded to Technician Plus.

After cranking up my CW speed to pass my General and Advanced exams, I assumed that would be the end of Morse for me. Not so! As I became proficient with the code I discovered its addictive qualities. I now average three CW contacts per week, and I'd work many more if I had the time. Take it from someone who started as an FM-only operator and who had no ambitions to move up: Get on the air and try CW. You'll be surprised at how much fun it really is! —*Jerry Venlet, KB8UMT, Byron Center, Michigan*

THANKS FOR THE MEMORIES

♦ When I read "The Doctor is IN" in the March, 1998 *QST*, I was delighted to see that VE3JDA shares my passion for listening to WQEW during the hours of darkness.

The Doctor's answer was excellent, but I'd like to add a little more background. WQEW endeavors to be just like the AM stations of my youth, playing many of the popular standards of that era and identifying with their call letters only, many years after most stations use slogans instead. No doubt most stations with music formats give some sort of slogan during every segue, but in this day and age it's likely to be something like "Q-100" or "EZ-95-FM". WQEW has only its call letters and frequency to give, so it gives them often.

In addition to playing the hits of my youth, WQEW, being located on the high end of the broadcast band, also brings back the sound of nighttime radio of my youth. Its signal propagates here almost completely by skywave with the resultant selective fading making Glen Miller's orchestra sound like it were playing on the other side of a tropical lake from where I am listening to it.

My listening post in the Washington, DC area, is off the back of WQEW's beam. Or, putting it in more accurate terms, I live in an area served by a secondary lobe while the majority of WQEW's power is radiated to the north. This means that WQEW serves as an excellent check on propagation conditions. Should the K index rise to 3 or 4, WQEW's signal component scattering out of the auroral zone overpowers the direct skywave and its signal takes on a definite auroral flutter here. Thus, when I am driving in my car WQEW's signal lets me know ahead of time whether I should fire up the 2 meter CW rig when I get home!

Ah, the romance! My wife, 22 years my junior, wonders how I can endure the distortion brought on by the selective fading—let alone enjoy that ancient music. (I admit to sometimes tuning the bedside radio to WQEW, much to my wife's annoyance.) Little does she realize how it takes me back to the days when a 14-year-old beginning ham had his AM radio on, listening to just this sort of music with just this sort of fading, while tinkering well past midnight with the latest project on his basement workbench. Thanks for the memories!—*Fred Laun, K3ZO, Temple Hills, Maryland*

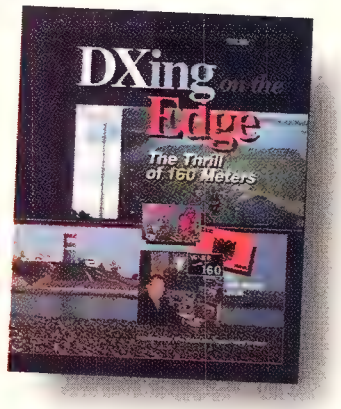
WHERE ARE THE RF ENGINEERS?

♦ While the emphasis today is on training "software engineers" or programmers, there is a definite shortage of competent RF engineers and RF systems engineers. These positions used to be filled from the ranks of Amateur Radio, but as I tell recruiters who are begging for candidates, the universities have not graduated any *true* RF engineers for at least 20 years. The few competent RF engineers are mostly retired, dead or happily employed at very good salaries.

I have been an RF engineer since graduation in 1954. I started as a design engineer specializing in antennas and somewhere along the line graduated to RF systems engineering. For the last few years I have been an RF systems consultant to such companies as Ericsson, Sprint, Cummins and MCI to name a few. With the new popularity of "wireless" systems, RF design and systems engineers are now greatly in demand. I have met with some young graduates who called themselves RF engineers, but they were totally lost when it came to hardware design, system analysis or propagation experience. Not one of them had a ham license or was interested in getting one.

The United States definitely needs Amateur Radio. We're one of the last institutions capable of providing a pool of individuals with real RF experience.—*Ralph Brooks, N6YRY, Inyokern, California* QST

Are you a *Topband* Operator?



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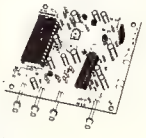

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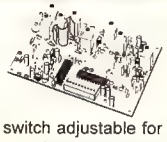

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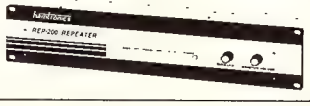

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This Month in Amateur Radio

May is certainly a "racy" month for Amateur Radio.

The Amateur Radio Transmitting Society, W4CN, will be on the air from Louisville May 1-3 to celebrate the 124th run for the roses, otherwise known as the **Kentucky Derby**. The **Indianapolis 500** time trials will be underway in early May and the Novi (Michigan) Amateur Radio Club, KC8FSW, is setting aside May 2 for their 2nd annual festival on the air to celebrate Indy 500-type racing cars. From May 30 to June 7 listen for TM6ACO from Le Mans, France, home of the grueling **24 Hours of Le Mans** auto race. For these operations and many more, see "Special Events" in this issue.

Make a crossband contact with a military station May 16 and 17 during **Armed Forces Day**! See page 107.

Head south to Baton Rouge, Louisiana, May 1 and 2 for the **Delta Division Convention**. Or join about 30,000 of your friends in Dayton, Ohio for the **Dayton HamVention**, May 15-17—the largest Amateur Radio convention in the world! At the end of May you can head west for the **Midwest/Dakota Division Convention** in South Sioux City, Nebraska, May 29 and 30, or the **Northwestern Division Convention** in Seaside, Oregon on the same weekend. If your sense of direction sends you eastward, check out the **Atlantic Division/New York State Convention** in Rochester, May 29-31. "Coming Conventions" in this issue has all the details.

If you're planning to attend the Northwestern Division Convention, think about fitting this ARRL-sponsored workshop into your itinerary: **RF Safety—The New FCC RF Exposure Regulations**. Ed Hare, W1RFI, ARRL Lab Supervisor will teach a workshop that clarifies what is required of hams, defines the new rules and explains the theory behind the requirements. The workshop takes place May 29 from 1 PM to 6 PM. You'll receive the course workbook, a copy of the ARRL RF-safety information package, plus five hours of practical instruction. Space is limited; to register, call Dan Miller, K3UFG, at 860-594-0340, or e-mail **dmiller@arrl.org**, before May 19. Price is $20 for ARRL members and $25 for nonmembers.

Remember "Mom" on May 10—**Mother's Day**. *After you've called her*, get on HF and work W8SP, the Mountaineer Amateur Radio Club at the International Mother's Day Shrine in West Virginia.

Hunting states this month? May offers a host of QSO parties. You can choose from QSO parties from Connecticut, Massachusetts, Oregon, Nevada, Indiana and Texas! See "Contest Corral."

A number of stations will take to the air over the **Memorial Day** weekend to honor the individuals who made the supreme sacrifice in service to our nation. Listen for KB2YCT, the Robert D. Grant Labor ARA from Nutley, New Jersey; KA5ACT from Killeen, Texas; K8TKA, the 20 over 9 ARC from Canfield, Ohio; and W8YAF from the Yankee Air Force Museum in Belleville, Michigan.

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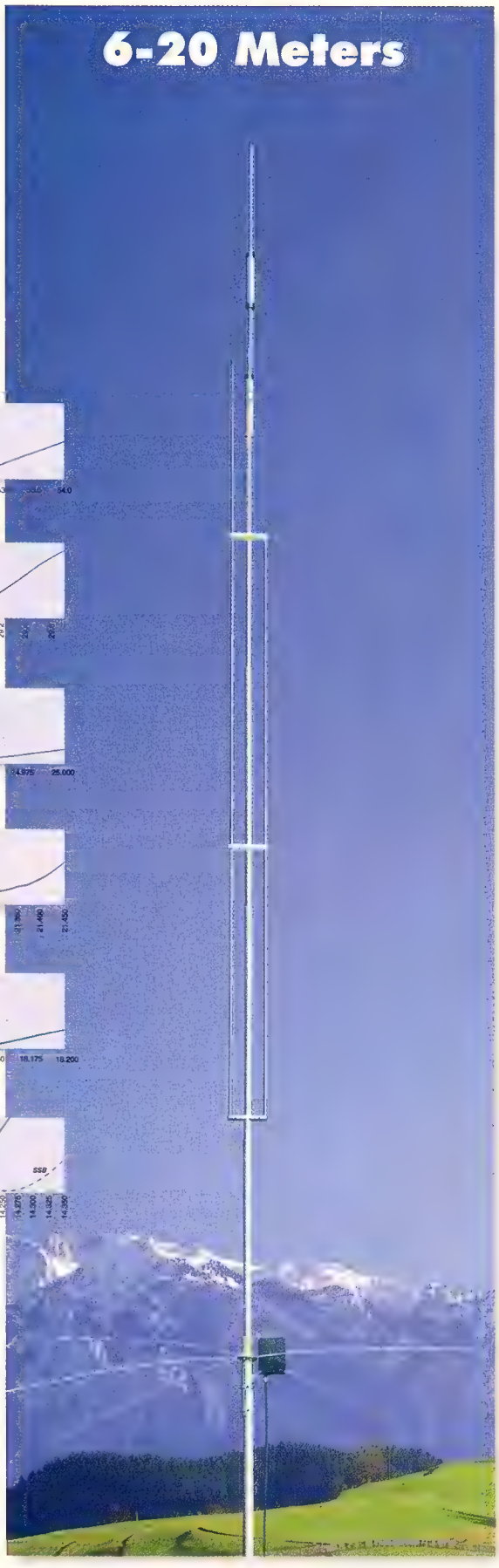
SPECIFICATIONS	R6000
Frequency, meters	6, 10, 12, 15, 17, 20
Wavelength each bd	Half-wave
VSWR minimum	1.2:1 typical
2:1 bandwidth, KHz	6m >3000
	10m >1700
	12m >100
	15m >450
	17m >100
	20m 300
Power, Watts out	1500
Radiation angle, deg.	16
Horizontal rad, deg	360
Height, ft (m)	19 (5.8)
Mast size range, in	1.5 -1.75
(cm)	(3.8-4.4)
Wind load, ft^2 (m^2)	1.5 (.14)
Weight, lb (kg)	12.5 (5.6)



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By James Enterline, KV2Z, and Scott Hamilton, N1VFW

North Pole PACSAT Triumph

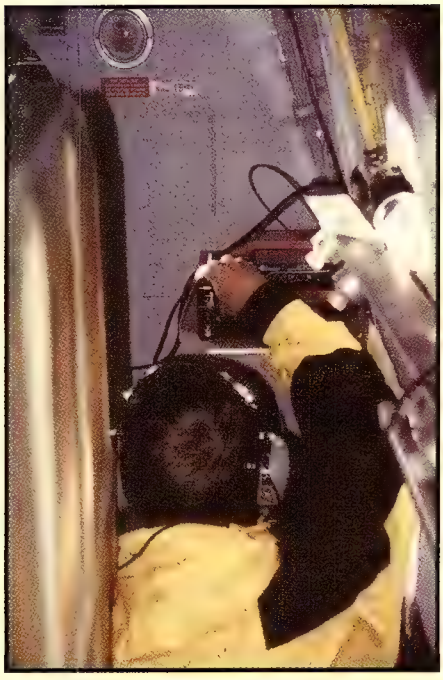
This Explorers Club expedition to the North Pole didn't reach its geographic destination, but its unique mix of ham radio, amateur satellites and biplanes was a success nonetheless. When these high-flying explorers head back to the Pole, you can bet that ham radio will be onboard!

"Flash: North Pole Expedition Makes Emergency Landing (everyone is OK)." So shouted the headline on The Explorers Club Internet home page. It was posted 11 hours and 40 minutes after two biplanes took off northward from Barrow, Alaska. The group's goal of reaching the North Pole was lost, but an equivalent goal of demonstrating Amateur Radio satellite communication in the high arctic was achieved fully.

The Explorers Club originated in 1904 after Robert Peary came back from the North Pole area. The group has always had an overriding goal to communicate expedition experiences among members of the scientific community.

Amateur Radio has been a part of many expeditions since then, and it became an official part of Club activities with the formation of a Radio Committee in 1987. A worldwide HF net of member stations, along with headquarters station K2XP, has since served maritime, terrestrial and polar expeditions.

The concept of using Amateur Radio aboard a biplane enroute to the North Pole developed in the spring of 1996 during a casual conversation at the club's New York City headquarters. Scott Hamilton, a member of the board of directors, was discussing the difficulties of communicating from remote areas with James Enterline, KV2Z, the chairman of the Club's radio committee. They were joined by Shane Lundgren, an aviator interested in arctic exploration. As often happens during these sessions, the result was an idea for an expedition.



The team's PACSAT operating position in the expedition aircraft is tucked between a 1200 liter auxiliary fuel tank (left) and the fuselage wall.

The goal would be twofold. First, to fly over the North Pole and commemorate the transarctic flight made in 1928 by aviation pioneers Sir Hubert Wilkins and Ben Eielson. Second, to use Amateur Radio satellite communications to provide timely position and status reports from the aircraft while in flight.

The aircraft for our journey would be a vintage Russian Antonov AN2 biplane, similar in speed to the aircraft used in 1928, which Shane had previously flown across Siberia. The Antonov's lumbering airspeed (just over 100 miles per hour) would provide many opportunities to communicate via polar orbiting Amateur Radio satellites.

Jim, who had "Elmered" a number of expeditions with HF radio support in the past, as well as engaging in his own PACSAT activity, offered encouragement. But he didn't suspect then that his experience would put him aboard an Antonov flying over Alaska's North Slope several months later!

The Explorers Club's board of directors

was sufficiently impressed with the merits of the aviation/communication project that it awarded it "Flag Expedition" status. It let the expedition carry the selfsame Club Flag that Wilkins and Eielson had carried on their transarctic flight in 1928. The Club's new web site (**http://www.explorers.org**) would become the ultimate target of the trip's downloaded messages, which intercepting hams could relay to the Club via the Internet.

Early Preparations

With the concept of the expedition in place we were now part of a team, and Shane went to work on the logistics of the aviation portion. Scott, already an instrument-rated pilot, began studying for his Technician Amateur Radio license. Two months later his efforts were rewarded with call-sign N1VFW. His next call was to ARRL Headquarters, which put him in touch with AMSAT (yes, he joined both organizations immediately, and Jim already belonged). He was also put in touch with Roy Welsh, WØSL. These contacts would become key to the project's success.

As the communication experiment began to evolve it became clear that the most difficult and critical issue was what type of antennas to use. Scott turned to AMSAT for advice, and the initial idea of using beam antennas was soon rejected. No matter how lumbering the airspeed, the stress such antennas would have to endure was extreme, as were the difficulties involved in tracking moving satellites from a moving aircraft. Helix and J-pole designs were also abandoned. To keep things simple while maximizing reliability, quarter-wave ground-plane antennas were ultimately chosen.

Before we knew it, AMSAT was swept up in the same enthusiasm we had for this novel project. AMSAT-NA Assistant VP of Engineering Stan Wood, WA4NFY, already busy with his Phase 3-D work, volunteered his scarce spare time to fabricate and test antennas for the project. The 2-meter uplink antenna was rather straightforward; Stan used an old-style stainless steel swept-back aircraft Loran antenna cut down and appropriately tuned.

The 70-cm downlink antenna turned out to be more of a challenge. A similarly modified aircraft antenna turned out to be highly sensitive to ground-plane conditions and threatened to make trouble in the unpredictable installation—where cold fingers would already have enough challenges.

An alternate suggestion from Stan was an antenna used on race cars. It would certainly stand up to our airspeed, but it turned out to have an unknown plastic insulator that might become brittle and crack in air temperatures as cold as –50° F. Stan eventually fabricated a cut-down aviation Emergency Locator Transmitter (ELT) antenna that was rated air-worthy and showed minimal sensitivity to ground-plane variations.

While this work was underway, Scott flew to Miami to attend an AMSAT-sponsored introductory course in amateur satellite communications hosted by Barry Baines, WD4ASW. After discussing the expedition with Barry and other satellite enthusiasts, the team chose specific station equipment.

The first decision was that a 9600-baud transmission rate would be essential, favoring the use of satellites UO-22 and KO-23. We selected an ICOM-821H radio for several reasons. The '821H is "satellite ready" right out of the box, required no modifications and its sensitivity made the idea of using ground-plane antennas at least theoretically possible. Furthermore, its compact size, 12-volt dc operation and reputation for ease of use and reliability were also important.

For our modem we selected the PacComm Spirit 2 for similar reasons. PacComm President Gwynn Reedy was most helpful and offered to have his technicians configure the modem specifically for use with the ICOM radio.

An ICOM AG-35 preamplifier was also procured for boosting the anticipated weak signal we hoped to receive from our 70-cm omnidirectional antenna. For software we selected *WiSP* (Windows Satellite Program) Version 6, which Scott installed on his Texas Instruments Model 5000 laptop computer.

Jim, KV2Z, checks the antennas after the PACSAT equipment was installed. Aircraft and PACSAT radios experienced no interference.

Overcoming Stumbling Blocks

Time was getting short before we had to leave for Alaska. With Stan still tweaking our antennas, we connected the other equipment to existing KV2Z antennas on the roof of Jim's New York City apartment. By this time Jim had been recruited to become a full participant in the flying expedition.

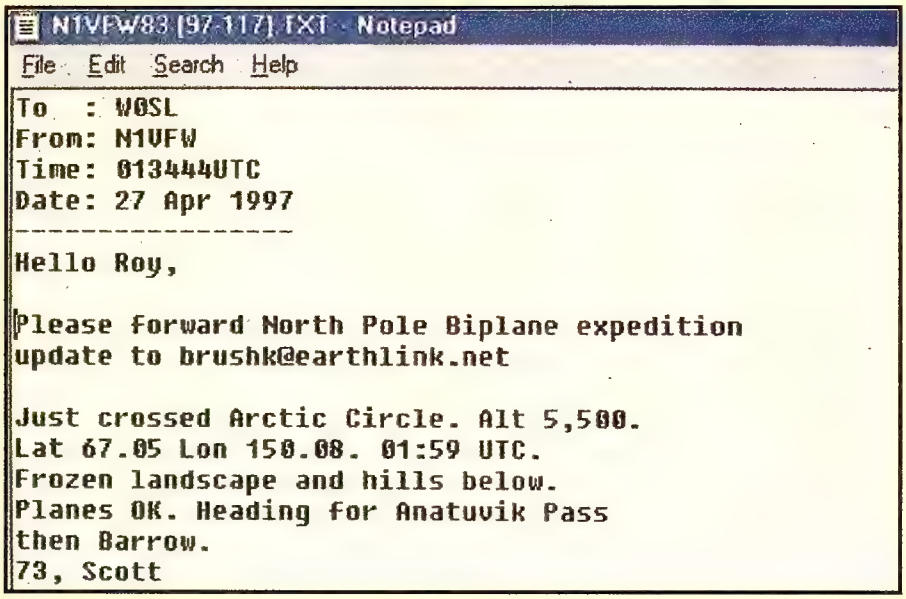
It was fortunate that we got that head start, because Jim immediately ran into some strange behavior. Supplied with orbital elements from a recent *AMSAT Journal*, *WiSP* was predicting satellite passes at times and angles to which our system responded with zero output.

The hardware worked fine with terrestrial signals and the antennas had previously worked on satellite signals. Suspecting a tracking problem, Jim acquired the newest Keplerian elements from the terrestrial packet network and manually reentered them. No dice. At this point it seemed wise to get another expert involved, so he called on AMSAT's Roy Welch, WØSL, who seems to know everything about *WiSP*.

Roy had Jim check the system time setting, his time zone setting and several other factors that might affect tracking. Cutting a long story short, they eventually discovered a bug in *WiSP*'s manual input routine (used when manually entering orbital elements).

Roy e-mailed an orbital data file directly from his computer, and the software worked perfectly as long as we refrained from manually entering our own data. Most users configure *WiSP* to let the satellites them-

Scott, N1VFW, checks the view from the pilot's seat, which contrasts with the view at his bulkhead-mounted PACSAT operator's position.


N1VFW83 [97-117].TXT - Notepad
File Edit Search Help
To : W0SL
From: N1VFW
Time: 013444UTC
Date: 27 Apr 1997
Hello Roy,
Please forward North Pole Biplane expedition update to brushk@earthlink.net
Just crossed Arctic Circle. Alt 5,500.
Lat 67.05 Lon 150.08. 01:59 UTC.
Frozen landscape and hills below.
Planes OK. Heading for Anatuvik Pass then Barrow.
73, Scott

A message sent from aircraft to PACSAT for relay by Earth station to The Explorers Club's Web site.

selves automatically update the software's Keplerian elements, and users hadn't previously encountered the bug.

With just a few days left before our scheduled departure for Alaska, we received our long-awaited package from Stan. We installed Stan's aircraft antennas, now in hand, on KV2Z's rooftop.

Here UO-22 and KO-23 pass sufficiently above the New York skyline once each morning and once each evening. The first message we successfully downloaded, amazingly, was from a station in Alaska! This would be a good contact to cultivate, as we might even get an "eyeball QSO" with him in a few days. Furthermore, the op would be a good candidate, with frequent polar satellite passes, to relay our satellite postings to the Internet.

Unfortunately, our uploaded appeal to him reached him after he'd departed to his field job on the North Slope. Nevertheless, that appeal was received by Russian operator Alexander M. Saveliev, RA6LUX, who was also in a good position to help us with relays. While we longed to close the circle with Alexander, we were out of time and absolutely had to tear down our station and pack for the commercial airline trip north.

Shane had been hard at work assembling the rest of the aviation team, which included Ron Sheardown, Donny Olson, Robert "Mads" Anderson and Ferdinand Von Baumbach.

Ron owns a similar Antonov biplane that he uses for mineral prospecting in Alaska. Thus the expedition would have two Antonov AN-2 biplanes headed for the North Pole. Donny Olson is an Alaska bush pilot and principal of Olson Air, specializing in helicopter reindeer herding (no kidding). Ferdinand is an explorer and pilot, usually based in Germany. Mads, a photojournalist, author and mountaineer, had reached the "Seven Summits" (the highest peak on each of the Earth's seven continents).

Alaska and Northward

The expedition team members, joined by a three-man *National Geographic* film team, assembled at Merrill Field in Anchorage on April 19, 1997. There we got our first look at the airplanes. The thought of biplanes had evoked the image of rickety, open cockpits, but here sat fabric-winged monsters with 1000-horsepower radial engines and cargo-hauling, walk-in metal fuselages.

After a full week of mechanical and engine work the two biplanes took off from Anchorage and headed north for Fairbanks. There we would meet Art Mortvedt, KL7RL, a bush pilot, polar logistics consultant and member of the Alaska-Yukon Chapter of The Explorers Club.

Art and Jim had previously used HF communications between New York City and the high Arctic. While in flight, Scott took the operator's seat and connected successfully with satellites UO-22 and KO-23 from our airborne ham shack. He transmitted position and status reports that Roy Welch subsequently pulled down and forwarded via e-mail to Explorers Club headquarters.

Airborne once again from Fairbanks, heading northward to the Eskimo Village of Anaktuvuk and on toward Barrow, Scott completed several more successful links with UO-22 and KO-23. On two occasions, though, the turbulence encountered near the Brooks Range was so rough we were unable to maintain adequate satellite links

The mountain passes were particularly wild rides, and at times the aircraft would roll and pitch so violently that we could barely read the computer screen or the dials on the radio. We were unsure if the drop-outs were caused by the dramatic shifts in our antenna orientation or the satellite's own antenna tumbling.

Once beyond the Brooks Range we encountered much smoother atmospheric conditions over the seemingly endless landscape of ice and snow comprising the North Slope. Here we saw no other stations connected to the satellites on descending passes—we had them all to ourselves. It almost seemed as if we could do a complete directory download in a single pass.

Several days later, after weather delays in Barrow, the expedition came to an early end as it neared a point known as "The Pole of Inaccessibility"—the point in the Northern Hemisphere farthest from human habitation.

A 12-hour flight over the frozen Arctic Sea ended at Mould Bay in Arctic Canada, several hundred miles short of The North Pole. Encounters with low ceilings and a resulting climb through ice-forming cloud layers made for some "white knuckle flying," but it was an engine oil leak and excessive fuel consumption in one aircraft that brought the expedition to an early conclusion.

This itself is an exciting story that will not be told here, but can be read, along with more radio details, on The Explorers Club Web page. Point your web browser to **http://www.explorers.org/northpole.html**, where you'll find all of the daily reports, including the satellite relays.

Mechanical problems prevented completion of the aviation objective of reaching the North Pole. Nevertheless, at this point the Amateur Radio communications objectives of the expedition had already been met. Amateur Radio had once again shown itself to be a remarkably versatile communications tool and, in this case, a means for explorers to communicate from very remote locations using amateur satellites. This North Pole expedition may be attempted again in the future. We hope that many Earth station operators reading this article will be ready to participate by relaying similar messages from the satellites via the Internet.

James Enterline, KV2Z, experimented with radio and audio for several decades before being licensed as WB2ORU in 1978. He was trained as a mathematician and physicist, and has had a career in computer consulting. Jim's 1972 book Viking America *entailed explorations in Greenland, Iceland and the Canadian Sub-Arctic, and his forthcoming book is entitled* Behind America's Discovery. *He is a performing French hornist and a Fellow Emeritus of The Explorers Club. E-mail James at* **kv2z@amsat.org**.

Scott Hamilton, N1VFW, obtained his Technician license several months prior to the North Pole Biplane Expedition. He is employed as a Vice President of Capital Markets at Advest, Inc, a member firm of the New York Stock Exchange. Scott also serves on the Board of Directors of The Explorers Club, Himalayan HealthCare Inc, and the Dooley Foundation—Intermed. As an avid explorer he has led and participated in expeditions to Bolivia, Argentina, the Patagonian Ice Cap, the Canadian Arctic, Iceland, Bhutan, Nepal and Tibet. He is the author of a number of professional publi-cations and articles. Get ready for a QSO from Mt Everest.... QST

By Don Lynch, W4ZYT

The Norwegian Lady

This Amateur Radio Special Event operation grew to international proportions, forging enduring friendships between hams in two cities who are linked by a wrinkle in the fabric of maritime history. The details are interesting and inspirational.

A century-old tragedy involving a Norwegian sailing ship and a seaside Virginia community has been memorialized since 1990 by The Norwegian Lady Amateur Radio Special Event. The event—part of a week-long festival of American-Norwegian friendship—commemorates the rescue of the crew of the SS *Dictator*, a sailing ship homeported in Moss, Norway, a small port city south of Oslo.

The *Dictator* was lost in a severe storm off the coast of Virginia Beach on Good Friday, March 27, 1891. While many crewmembers were saved by Virginia Beach residents who risked their lives braving the storm, five members of the crew, plus the wife and young son of the ship's captain, J. M. Jorgenson, drowned.

Several days after the storm, the ship's figurehead, a magnificent wooden carving of a woman carrying a staff, was washed ashore. For years the figurehead displayed at the Virginia Beach oceanfront, where it became known as The Norwegian Lady. In 1953, the figurehead was damaged by Hurricane Barbara and was removed to a city garage for storage. Forgotten until the early '60s, it had deteriorated beyond repair. Only fragments of the original figurehead remain on display at the Old Coast Guard Station museum at 24th Street and Atlantic Avenue, Virginia Beach.

The *Dictator* tragedy drew the cities of Moss and Virginia Beach together, and the story of the tragedy and the rescue fascinated both communities. In the early '60s, Erik Bye, a well-known radio personality from the Norwegian Broadcasting Corporation took an interest in the story. With his leadership, and that of Moss Mayor Emil Andersen, funds were raised from shipping and industrial companies for a new, permanent bronze memorial at Virginia Beach. Civic organizations from Moss also raised funds for an identical statue to be placed at Moss, and Norwegian sculptor Ornulf Bast was commissioned to create the works.

In 1962, identical bronze statues, replicas of the *Dictator*'s figurehead, were dedicated in each city. The Virginia Beach Lady stands in a small park at the intersection of 25th Street and Atlantic Avenue, facing east, out to sea. The statue at Moss stands in a park at the harbor, also facing the ocean. At the base of each statue is the inscription:

"I am the Norwegian Lady. I stand here to wish all men of the sea a safe return home."

Each year, a ceremony is held at 2 PM on the Saturday closest to March 27, honoring the lives lost in the tragedy and the friendship between the two cities. In Virginia Beach, the mayor lays a wreath at the base of the statue and a Navy band plays the national anthems of Norway and the United States. A similar ceremony is observed by the people of Moss.

The Norwegian Lady Special Event

In the early 1980s, amateurs from the Virginia Beach Amateur Radio Club (VBARC) began The Norwegian Lady Special Event, a radio operation held on the weekend corresponding to the anniversary of the *Dictator*'s rescue. Since 1990 the project has been coordinated by Charlie, W1WTG, and Ed, KN4KL, and has involved operation on all HF bands—SSB and CW—as well as on 2-meter FM using the club's WA4KXV repeater.

Stations confirming contact with the special event operators are rewarded with an attractive certificate. Interest in the event has grown over the years, and as of 1992, club members would often work 400 to 500 QSOs during each weekend.

Following the 1995 Norwegian Lady weekend, Don, W4ZYT, a member of VBARC and then president of the Virginia DX Century Club—the DX Club of Tidewater/Southeastern Virginia—suggested that the club consider expanding the event to include stations from the Moss area.

With the encouragement of the VBARC leadership, W4ZYT contacted Moss officials, who put him in contact with Roy, LA3FT, the secretary of the Norsk Radio Relae Liga av Moss, the local Moss Amateur Radio club. Shortly thereafter, W4ZYT received a phone call from Carl, NF5E, a petroleum executive now living in Colorado, who had spent many years in Norway. Carl was friends with many of the Moss hams and was able to put W4ZYT in contact with Kjell, LA9GJ, an active member

of the Moss radio group, who would serve as the Moss liaison for the joint Norwegian Lady activities.

The weekend of March 23-24, 1996, was selected as the initial activity weekend, and members of both clubs began operations at 1400 UTC Saturday, March 23. The Norwegian hams used Moss club station LA5M, and the Virginia Beach hams operated using club call sign WA4TGF. Despite disappointing conditions, 685 QSOs were made by the official stations, with some 90 stations completing QSOs with both LA5M and WA4TGF.

Unfortunately, the club station at LA5M was undergoing antenna repairs, which limited operations on the higher HF bands; most of its contacts were with European stations on 75-meter SSB.

A certificate was awarded for a contact with either LA5M or WA4TGF, and a special endorsement was granted for contacts with both stations. Members of both clubs agreed that the initial effort had been worthwhile and vowed to refine the operation for the 1997 Norwegian Lady Event. Our joint goal was to exceed 1000 contacts with hams in at least 50 countries.

In the summer of 1996, Kjell, LA9GJ, a major in the Royal Norwegian Air Force, visited Virginia Beach on business and brought with him several members of his family. Members of the Virginia Beach Amateur Radio Club hosted him at a potluck dinner, and in return were treated to a talk on Amateur Radio in Norway and on the Norwegian Lady Operations from Moss. Also attending the meeting was Elsa XE3VD, a Mexican ham from Progreso, Yucatan, who had learned of the Virginia Beach Club by working the 1995 Norwegian Lady Special Event.

One of the high moments of the evening was Kjell's reading of a message from Jon Klepzig, LA7IL, who had been a member of the Royal Norwegian Navy detachment that brought the Norwegian Lady statue from Moss to Virginia Beach in 1962. The following evening, Kjell, his family, Elsa, and Virginia Beach hams W4ZYT, KN4KL and N4AIG (now W4SD) met at the Norwegian Lady statue for pictures, and then went on to dinner at a local restaurant. Friendships were cemented, and further plans were made for the 1997 Norwegian Lady Event.

A Successful International Special Event

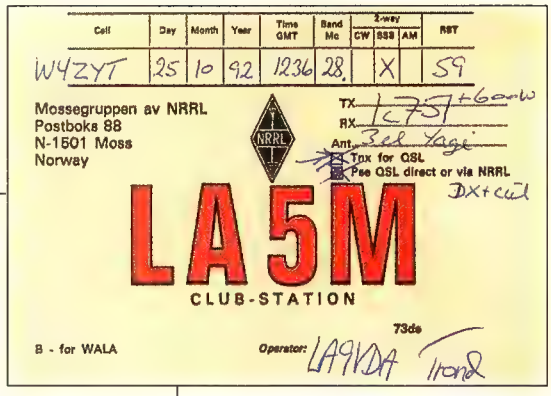
The 1997 Norwegian Lady Special Event was scheduled for Saturday and Sunday, March 22-23. The Moss club station, renovated and with a new HF antenna system, was primed and ready. The Virginia Beach Amateur Radio Club was sporting its new club call sign, W4UG, formerly held by the late Gay Milius, a highly respected Virginia Beach ham leader and well-known DXer.

At 1330 UTC, the first calls went out from both stations, and shortly thereafter, W4UG found LA5M at 14.280 MHz, and old friends from Virginia Beach greeted old friends from Moss. A full 24 hours of multiband, multimode operations ensued. When the weekend activities were tallied, almost 1100 QSOs with hams in 53 DXCC countries had been achieved. Both clubs agreed that the International Norwegian Lady Event was a complete success.

Stations who worked W4UG or LA5M during the 1997 Norwegian Lady Weekend may claim an attractive 9 × 12-inch commemorative certificate by sending a QSL card and an SASE to VBARC (ATTN: Norwegian Lady), PO Box 62003, Virginia Beach, VA 23462. A special endorsement is available for operators who worked both club stations. QSLs received for LA5M will be forwarded to the club. Both clubs now plan to make the International Norwegian Lady event a regular fixture of their radio activities, and we hope to offer QSOs for this special DX event to interested hams worldwide.

You can reach the author at 1517 W Little Neck Rd, Virginia Beach, VA 23452.

Norwegian Lady certificates presented to Elsa, XE3VD, and Kjell, LA9GJ. (Shown l-r are Don, W4ZYT; Ed, KN4KL; Elsa, XE3VD; and Kjell, LA9GJ.)



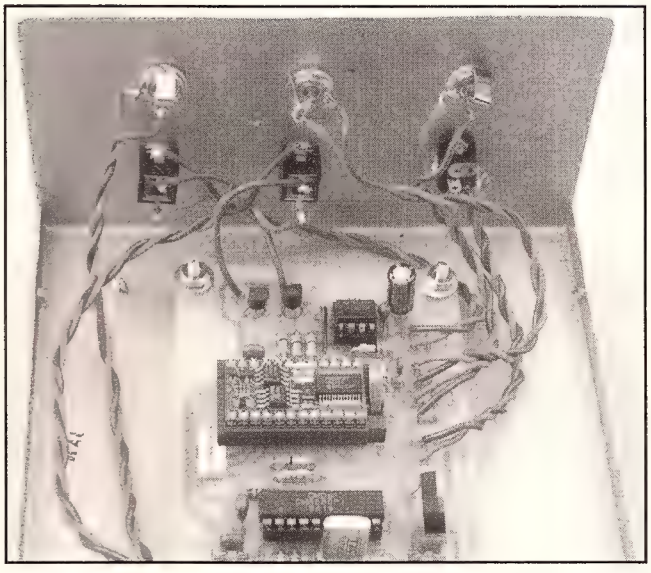
LA5M's QSL.

The Virginia Beach Norwegian Lady statue (Shown l-r are Ed, KN4KL; Elsa, XE3VD; O.B., N4AIG (now W4SD); Kjell's grandsons Roy and Kim; Kjell, LA9GJ; and Kjell's son Morton.)

By John Hansen, W2FS

An Inexpensive, Remote-Base Station Controller Using the Basic Stamp

Now *you* can operate your home station while you're in your car, or at another location. Clubs can set up remote HF stations for all members to use, too!



An inside view of the Remote-Base Station Controller. In this unit, a ZIF socket is used for U2 to allow easy replacement when experimenting.

Amateur Radio operators have been using remote bases for years. A *remote-base station* allows you to access most of the functions of an HF radio from a remote location using either a portable (H-T) or mobile link radio. To use a remote base, you need an *HF radio*, a *link radio* (to link to the remote user—generally this is done on UHF) and a *remote-base controller* to act as the glue between them.

A few remote-base controller interfaces have been commercially available in recent years. This controller differs fundamentally from them in two respects: First, it uses an inexpensive, user-programmable microcontroller called a *Basic Stamp* to control the HF radio. This helps keep the project's cost low. Secondly, it controls the HF radio via the radio's standard computer connector. In the case of my ICOM IC-706 transceiver, this is the ICOM CI-V interface. This greatly expands the capabilities of the interface, because the HF radio's frequency, mode, etc, can be read directly from the radio and transmitted to the remote user via Morse code.

Functional Overview

To gain an appreciation of how this interface unit works, refer to Figure 1 while I describe a typical operating session. Using my H-T, I begin by keying in a two-digit password that activates the system. (The password is used to turn on the system and prevent unauthorized users from accessing it.) After entering the two-digit code, I can hear the HF rig's receive audio coming through. On a typical afternoon, I'll want to operate on 20 meters. I enter a **D** from the H-T's DTMF keypad, followed by **14*16** and another **D**. The **D**s tell the controller that I want to *directly* enter a frequency, and **14*16** means *go to* 14.16 MHz. The microcontroller's firmware is smart enough to sense whether I mean kilohertz or megahertz. That is, it knows 14.16 means megahertz, but if I enter 7150, it knows to use kilohertz. Similarly, the controller assumes a number such as 146.625 means megahertz. You need enter only the nonzero portion of the frequency. For example, if I had entered **D14D**, the radio would have gone to 14 MHz, the bottom of the 20 meter band. This allows for rapid band changes.

Once I have the radio on 14.16, I want to tune up the band and see what's on. This is accomplished simply by transmitting an **A** from the DTMF pad. The HF radio starts scanning up the band just as if I was at home turning the main tuning knob. When I hear a station calling CQ, I stop the scan by pushing any key on the H-T's DTMF pad (with the PTT button engaged, of course). Sometimes, fine tuning is necessary. The pad's **1** key moves the HF VFO down one step, and the **2** key moves it up. The default step size is 100 Hz, but it can be changed to anything from 1 Hz to 10 MHz, by pushing the * key followed by the digit representing the step size: 1 = Hz; 2 = 10 Hz; 3 = 100 Hz, etc.

When I have the station tuned in, I might want to know what frequency it's on. If I push the # key, the remote base transmits the radio's complete frequency in Morse code. However, I knew I was on 20 meters, and if I want to know only the *kilohertz* digits, I press the **6** key. The controller then transmits only the three digits corresponding to the kilohertz part of the frequency. Pressing **3** gives me the *hertz* digits; pressing **9** tells me the *megahertz* digits.

When the station I'm interested in finishes calling CQ, I press the **5** key in the middle of the key pad to engage the HF radio's PTT. Then, anything I say into the H-T is retransmitted on HF. When I'm done with my transmission, pressing any key turns off the HF transmitter. If my H-T battery dies in the middle of a transmission, a built-in watchdog timer automatically unkeys the HF radio after approximately three minutes. When I'm

Figure 1—Remote control commands issued via the DTMF keypad.

Key	Function
1	Tune down one frequency step.
2	Tune up one frequency step.
3	Transmit the Hertz portion of the HF radio's frequency in Morse code.
A	Start the HF radio tuning up the band.
4	Turn off the link, ID and return to standby.
5	Key the HF radio's PTT line.
6	Transmit the kilohertz portion of the HF radio's frequency in Morse code
B	Go to a specific radio memory. For example, **B12** tunes the radio to memory 12.
7	Force the link to transmit the ID in Morse code.
8	Step through the following modes: USB, LSB, AM, FM.
9	Transmit the megahertz portion of the HF radio's frequency in Morse code.
C	Change a portion of the HF radio's frequency. For example, **C3***XXX* changes the Hertz digits to *XXX*, **C6***XXX* changes the kilohertz digits to *XX*, **C9***XXX* changes the megahertz digits to *XXX*.
*	Change the HF radio's step rate: *1=1 Hz; *2=10 Hz; *3=100 Hz; *4= 1 kHz, *5=10 kHz, *6=100 kHz; *7=1 MHz, *8=10 MHz.
0	Transmit the HF radio's mode in Morse code.
#	Transmit the entire HF radio frequency in Morse code.
D	Set the HF radio frequency directly: **D14*235D** sets the radio to 14.235 MHz. *is used as a decimal point after the megahertz digits. The frequency can be set in 1-Hz increments. Any digits omitted at the end of the string are assumed to be zeroes. For example, **D7D** sets the radio to 7.0 MHz.

done with my operating session, pressing the **4** key forces a CW ID on the link frequency, then switches the system to standby.

Operating from a remote base is about as easy as it is when I'm sitting at home in the shack! In some ways, it's even easier. The ICOM IC-706 has no built-in mechanism for direct frequency entry, yet this *is* possible when operating through the remote base with my H-T. I recently operated the European Field Day contest with my H-T and worked 10 countries in about a half hour.

The remote base allows you to shift the HF radio's frequencies, change modes, access the radio's memories, scan the band, etc. Using Morse code, the remote base keeps you informed of the HF radio's operating frequency and mode. To keep your operation legal, the remote base also remembers to transmit your ID on the link frequency in Morse code every nine minutes. As an added benefit—because the microcontroller in this unit communicates using 5 V TTL-level signals—you can run its computer output directly to a '706 (or other ICOM radio; more on this later) *without purchasing* a computer interface level converter (such as the CT-17 CI-V level converter unit). Thus, most of the cost of this project can be recouped in savings by not having to buy a level converter!

Basic Stamp Overview

The heart of the remote-base controller is a Basic Stamp II microcontroller. I'm an economist, not an engineer, and this is the first piece of equipment I've ever designed myself. That, in itself, gives you a clear idea of just how *easy* it is to work with the Basic Stamp microcontroller! Those who argue that the advent of highly integrated circuits sounded the death knell of home design and construction have simply never worked with the easy-to-use digital and RF building blocks that are now available for so little money. This circuit is a case in point.

The Basic Stamp II (BS2) is produced by Parallax, Inc.[1] It is a general-purpose microcontroller based on the PIC16C57 IC. (For a comparison of the Basic Stamp to a PIC, see the sidebar, "Basic Stamps and PICs—What's the Difference?" The BS2 can easily be programmed using the BASIC computer language. The BS2 retains its program even when its power is removed. Turning on the power merely causes the BS2 to automatically restart the program you've stored in it. The BS2 is programmable (and reprogrammable) without any special-purpose hardware—you simply hook the chip to your computer's serial port. You don't need a UV eraser to erase the BS2, either. Loading a new program automatically overwrites the existing program. The BS2 can be reprogrammed up to *10 million times*, so you can feel free to load a draft of your code just to see how it runs.

The BS2 has 16 pins that can be used as inputs *and* outputs. Inputs might include such items as pushbuttons, potentiometers, logic circuit outputs, various kinds of sensors (temperature, pressure, etc), or even serial data from a computer (or the computer port of a radio). Outputs can be transistor switches, relays, LEDs, alphanumeric displays, audio—even serial data streams. The BS2 simply takes the information provided to it by the inputs, processes it and performs some action on the outputs.

Here's How

An example may help to clarify how this process works. With my remote-base controller, I push the **#** key when I want to know which frequency I'm on. When I push the H-T's **#** key, the audio heard by the link receiver is routed to a DTMF decoder. That IC sends the BS2 a number indicating which key it heard (**#** = 12). The Stamp knows that this is a request for the current operating frequency, so it then sends serial data on an output pin to my IC-706 that asks what frequency it is on. The Stamp then *changes that pin from an output to an input*, and receives the incoming data from the '706. Another program section converts this data into a string of numbers representing the frequency. These numbers are then routed to a Morse code section of the program that transmits each number in Morse as audio on another output pin. That output is then fed to the link transmitter and I hear the transmission on my H-T! Complicated? Not at all!

You can perform this type of programming with little investment of time and money. The programming software is *free* at Parallax's Web pages (**http://www.parallaxinc.com**). At the same location, you can pick up a copy of the BS2's manual in Adobe Acrobat format. This extraordinarily good manual will have you up and running quickly. It is, however, a very long document, so have *plenty* of paper on hand if you plan to print a copy!

So, to get started with the BS2, all you need to buy is the Stamp itself (about $50) and a board to hold it. Parallax sells prototyping boards for about $20, but I bought a multipurpose PC board at Radio Shack (276-150) for $1.19, and a 28 pin IC socket (276-1997) for another 99 cents. (PC boards are available for this project.[2]) You need to power the circuit, of course, and for experimental purposes, a 9 V battery works

[1]Notes appear on page 37.

Basic Stamps and PICs—What's the Difference?

In recent months, a number of *QST* projects have featured Microchip Technology Inc PIC microcontrollers. These chips are quite inexpensive, yet are a rather powerful means of building stand-alone computing capabilities into your projects. The Basic Stamp—used in this project—is actually just a PIC itself, coupled with a proprietary BASIC language interpreter that allows it to understand BASIC commands and be easily reprogrammed. So, you might ask, when should I use a PIC and when should I use a Stamp? The differences between the two include price, ease of use and power.

Price

The cheapest Basic Stamp costs more than all but the most-expensive PIC. The Stamp used in this project costs just under $50, while PICs generally cost less than $10. If you are building only one copy of a particular item (especially if the overall cost of the project is significant) this price difference may not matter. But if you are making many units, or the overall cost of the project is otherwise small, the savings may be worth the relative inconvenience of using a PIC.

Ease of Use

The biggest advantage of Basic Stamps is that they are very easy to use. They can be programmed in BASIC by simply using a serial port cable—no hardware programming device is needed. You can make changes to your code and quickly load it into the Stamp for testing. The development tools are free for the downloading.

PICs, on the other hand, are most often programmed in assembly language, which is significantly harder to learn than BASIC. Some excellent compilers are available that allow you to program PICs in languages such as C, but none is pubic domain or shareware. Programming a PIC requires that you buy or build a PIC programmer—a hardware device that attaches to your PC to burn the code into the chip. Loading your code into a PIC also takes substantially more time with a PIC than it does with a Stamp, making it more difficult to make changes to your program and see the results. Furthermore, for any of the PIC chips other than the 16C8/16F8 family, you will need an ultraviolet-light EPROM eraser to erase the old code from a PIC before you can put in the new code. This adds another three to four minutes to the programming cycle.

Power

PICs run substantially faster than Basic Stamps. Although the Basic Stamp has a PIC as its processor, the instructions that you write are stored in an EEPROM. The PIC chip is programmed with the BASIC interpreter. Each instruction is read out of the EEPROM by the embedded PIC, processed by the interpreter, and then performed by the PIC. While this is about a thousand times slower than having your code reside in the PIC itself, for many applications (including the remote base controller) you won't notice the difference.

PICs are also available in a wide variety of flavors. Some have really large numbers of I/O pins (more than twice as many as a Stamp). Some have on-board analog-to-digital converters, while others have built-in serial ports. Some have a huge programming space (up to 64 kbytes). Thus, you can select the particular PIC whose features match your needs.

Basic Stamps are an excellent way to learn about the capabilities of embedded microcontrollers and to rapidly develop useful applications. If you find it to be fun and rewarding, it may be worth your while to consider moving to PICs.—*John Hansen, W2FS*

just fine. You also need to build a cable to hook the chip to your computer's serial port. Diagrams for doing this are also available at the Parallax Web site.

If you don't know anything at all about computer programming, but want to learn, I'm hard-pressed to think of a better place to start than by programming the Basic Stamp.

Circuit Description

I got the idea of building a remote base controller using the Basic Stamp when I discovered that Scott Edwards Electronics had developed a DTMF transceiver application kit to go with the Stamp.[3] This kit provides a California Micro Devices CM8880 DTMF transceiver chip, along with complete documentation for interfacing it to the Stamp or other PIC microcontroller, including circuit diagrams and sample programs using the device. (See the sidebar "Why I Chose the CM8880.") Combining the CM8880 and the Stamp allows you to remotely control virtually *anything* from your H-T. The Stamp, for example, has an X-10 home automation support built into it, so you could use such a system to remotely turn appliances on and off.

The major components of the circuit (see Figure 2) are the CM8880 DTMF transceiver, U1, and the Basic Stamp, U2. A 555 timer (U3) keeps track of when it's time to ID. U2 pin 12 triggers U3, which causes U2, pin 17 to go high for about nine minutes. Every couple of seconds, U2 checks to see if pin 17 is still high. If it isn't, U2 IDs and triggers pin 12 again.

Q1 and Q2 key the HF radio PTT lines (via pin 19) and the link radio (via pin 18). Y1 can be a common TV colorburst crystal. Although U2 has an on-board 5 V regulator that can provide 5 V to external circuits, it doesn't have the current capacity to power U1. As a result, I added a 7805 regulator, U4. The current through U4 is sufficiently small that no heat sink is required.

The circuit is simple because most of the logic that you might expect to see in a remote-base controller is implemented not in logic ICs, but in the Basic Stamp firmware that recognizes inputs and responds with changes in outputs. The inputs for the Basic Stamp are the connections to the DTMF transceiver (that decodes the tones into numbers on pins 5-11), the input from the timer (that tells the Stamp via pin 17 when to ID) and the data connection to the radio (pin 13). Because the Stamp is doing nothing else after you key the PTT line on the HF radio, even the watchdog timer can be implemented entirely in software!

A second watchdog timer implemented in software times out the link radio. Although the link radio IDs every nine minutes, if your H-T battery dies, you may wish you had turned the link transmitter off! A timer is used to turn off the link if it hears nothing from the H-T in any 10-minute period. Every time you send a DTMF tone to control the HF radio, this timer is reset.

U2's outputs are the two PTT lines (pins 18 and 19), the line to trigger the timer circuit (pin 12), the audio output for the various CW functions (pin 14) and the serial link to the radio (pin 13). Because the '706 sends and receives serial data on the same line, it is fortuitous that the Stamp is able to switch pin 13 between being an input and being an output—only *one pin* is required for all communication to and from the radio!

Construction Notes

I built my remote base in a standard Radio Shack project box (RS 270-274) though any box suitable for mounting the PC board would work well. The programming connector (P1) is required only when you're programming U2. Therefore, I saw no need to provide a permanent panel-mounted connector. Instead, I installed a 4-pin SIP header. I connect an appropriate interfacing cable between the header and computer when needed. Of course, the enclosure must be open to do this. If you are using the pre-programmed Stamp (see Note 4), you need not install the programming header.

Use sockets for the ICs. Over 90% of the cost of this project is tied up in two chips. Be *very careful* to ensure they are wired properly before you apply power! Before installing the chips, wire everything else, then conduct a number of tests. Apply power to the voltage regulator and make sure that you measure +5 V on pin 20 of U1's socket and pin 21 of U2's socket. Then, remove power and check each adjoining pair of pins of each IC socket to make sure that there are no solder bridges. Using your multimeter, you can check your wiring against the schematic to ensure the connections are right. Check and *double-check* everything before installing

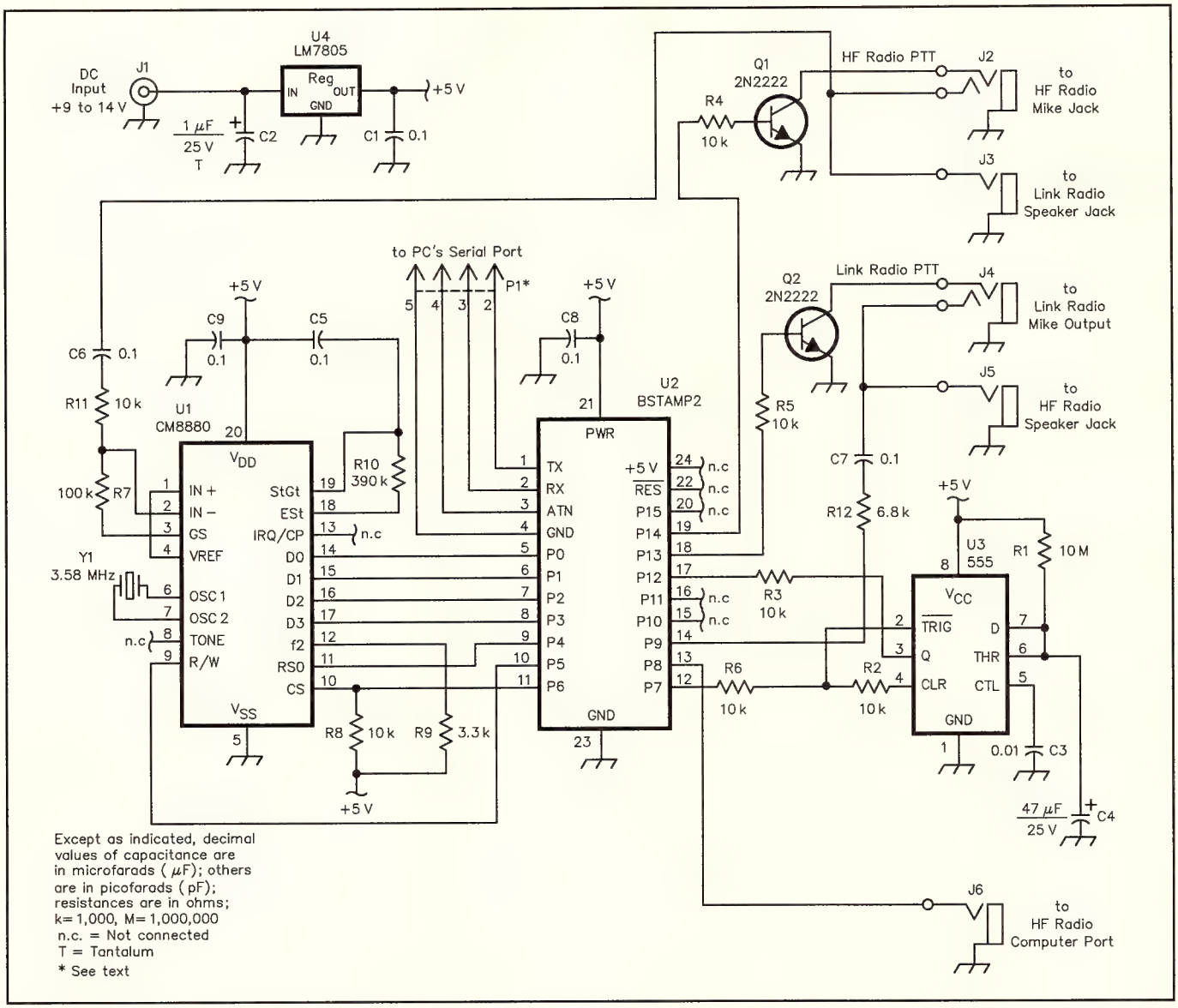


Figure 2—Schematic of the remote-base controller circuit. Equivalent parts can be substituted. Unless otherwise specified, resistors are 1/4 W, 5% tolerance carbon-composition or film units. Part numbers in parentheses are Radio Shack. Observe proper polarity for polarized components.

C2—1 µF, 25 V tantalum
C4—47 µF, 25 V tantalum or aluminum electrolytic
J1—Dc input connector (RS 274-1565)
J2, J4—1/8-inch, 3-circuit normally open phone jack (RS 274-351)
J3, J5, J6—1/8-inch, 2-circuit normally open phone jack (RS 274-249)
P1—4-pin SIP header.
Q1, Q2—2N2222 (RS 276-2009)
U1—CM8880 DTMF decoder (see text and Note 3)
U2—Basic Stamp II (see Note 1)
U3—555 timer (RS 276-1723)
U4—7805 5 V, 1 A regulator (RS 276-1770)
Y1—3.58 MHz color-burst crystal (RSU 11321437)
Misc: PC board (see Note 2), hardware, IC sockets, enclosure, mating connectors and cables.

the ICs and again applying power.

Once the wiring is done, you need to load the firmware into the Stamp. This is not a difficult process and is explained in detail in the Stamp manual. If you prefer to not do the programming yourself, preprogrammed chip sets are available.[4]

You could add potentiometers to the audio lines to adjust the audio levels going to each transmitter. I found that using the radio's volume control to adjust the audio coming into the device works well, so I did not add audio gain controls to the circuit. You may find it necessary to change the value of R12, however. It controls the level of the Morse code audio from the Stamp. A value of 6.8 kΩ works quite well in my station, though this is partly a matter of personal preference. Increasing the value of this resistor reduces the volume of the Morse code output.

Using the Remote Controller with Other Radios

The software I wrote for the remote-base controller is intended to work with the ICOM 706, and this is the only radio that has currently been tested with it. To use it with the '706, set the following IC-706 menu parameters:

10 SCAN SPEED LO
21 CI-V ADDRES 48H (Note: The default setting on the '706 MKII is 4EH, but can be changed to 48H)
22 CI-V BAUD Auto (or 1200)
23 CI-V TRN On
24 CI-V 731 Off

The controller should also work without modification with any ICOM radio that uses

five bytes to communicate its frequency, if the address of the radio can be changed to $48 (48 hexadecimal). If the address cannot be changed, only a minor modification of the program is necessary to set the program's address to that of the radio. Using this technique, it should be possible to get the controller working with the new IC-756 and most other ICOM radios that are controllable through the CI-V interface. The program will *not* work without modification on ICOM radios that use *four* bytes to communicate their frequencies—these include the IC-731 and IC-735. However, relatively minor modifications to the program (simply using four bytes instead of five to represent the frequency) should allow these radios to work as well.

Depending on the capabilities of the radio's computer interface, it is probably possible to modify the program to work with radios other than those manufactured by ICOM. The communication functions that are used by this program are:

- Get the radio's operating frequency
- Get the radio's mode
- Set the radio's frequency
- Set the radio's mode
- Start scanning
- Set the radio's memory

These fairly basic functions are likely to be available on most computer-controlled radios.

Software Modifications

The Basic Stamp Remote-Base Controller source code is not in the public domain and is not shareware. It is available, however, free of charge for use by individual hams for constructing a single unit for their own personal use. If you decide to program your own Basic Stamp for this project, at a minimum you will need to change the call sign in the software so that it uses your call rather than mine. You may also want to change the password that brings up the system and sets the duration of the watchdog timers. If you are using a radio other than the IC-706, you will probably need to change the radio's address in each of the program statements that begin with SERIN or SEROUT. Instructions for making both of these changes are embedded in the source code itself, which is available at the ARRL's ftp site.[5]

Summary and Notes

Simply because you have the technical capability to listen throughout the range of IC-706's receiver does *not* mean that you can legally retransmit everything you hear! Your best bet is to stay in the ham bands. Transmission of music, broadcasting, etc, are, of course, still against the law, even when you are using a remote base. This seems obvious, but operation with the Basic Stamp remote base is so transparent that sometimes you forget that you are not actually sitting in front of the HF radio!

Pay close attention to the regulations concerning remote control of Amateur Radio stations. You must communicate with your base station (in *both* directions) on a frequency above 222.15 MHz.

I have run into a problem with ground loops on the base-station side when the HF radio and the link radio were connected to the same power supply. In my station, I solved this problem by using an isolation transformer in the audio line between the link receiver and the remote-base controller. If you run into this problem, you can solve it either by using separate power supplies for the two radios, or by experimenting with audio isolation transformers. If you do have this problem, and you have a couple of miniature 8 Ω to 1 kΩ audio transformers, wire them back-to-back to construct an isolation transformer.

Be careful with your selection of a link radio. The entire time you are listening on the HF bands with your H-T, the link radio is transmitting. Choose a radio and power level that accommodate extended key-down periods.

You can view the Basic Stamp code that I've written as a starting place for adding your own functionality to the unit. Although there is a limit to the overall size of the program that can be put into the Stamp, you can remove some of the capabilities that I've incorporated and write code that implements features you prefer. You could, for example, have a one-keystroke command to go to a particular net frequency or a frequency on which you have a regular schedule. Or, write code to use both the A and B VFOs so you can operate split. Furthermore, there are still three unused I/O pins on the Stamp. You could use one pin to control an antenna switch. Or, use two pins to operate your station's antenna rotator directional controls and use the third pin to provide feedback of the rotator's direction, which could then be relayed to you remotely in Morse code. It would even be possible for you to enter the azimuth in degrees via the DTMF pad and have the Stamp automatically guide the rotator to the desired direction. What you can do with the Basic Stamp is limited mostly by your own imagination. I have made source code available so that you can perform modifications to it without having to rewrite all the control routines from scratch.

Formerly licensed as WAØPTV, John Hansen, W2FS, has been an Amateur Radio operator since 1966. His interests include satellites, digital communication and "homebrewing." For a number of years, John was the editor of The AMSAT Journal, *and is the 1993 recipient of the ARRL Atlantic Division Technical Achievement Award for his work on digital satellite gateway software. John maintains a career as a Professor of Economics at the State University of New York to provide enough income to purchase radio equipment and Basic Stamps. You can contact John at 49 Maple Ave, Fredonia, NY 14063; e-mail* **hansen@fredonia.edu.**

Why I Chose the CM8880

Because the pin-outs and external component requirements for the MT8870 DTMF decoder are so similar to those of the CM8880, I initially assumed the only difference between the two was that the CM8880 is a transceiver and the '8870 is only a receiver. An evening's experimentation and documentation review showed me otherwise. Now I understand why the CM8880 costs more than the '8870, and why Scott Edwards selected it for his DTMF AppKit for the Basic Stamp.

The '8870 does just what it's supposed to do: It receives DTMF tones and latches them on four output pins, just like the '8880 does. However—the only way to reset the latches is for the '8870 to either receive another tone, or to wait a specified period of time. The '8880 has an internal register that can be read, and when it's read, it's reset, so you can essentially clear the output pins using one pin of the Basic Stamp.

As a result, for single tones, the '8870 works great. It will also work okay for tone sequences—if you carefully time how fast you push the keys that make the tones. There may even be some situations where the '8870 is preferred. If you hold down a key for a long period of time with the '8870, it continues to send the same tone. This is rather like the continuous-fire button on a joystick. The '8880, on the other hand, interprets this as *one keypress*, unless you let up and push the key again. For the remote-base project, the latter behavior is clearly preferred. The '8870 is inappropriate for use in this project because it relies so heavily on multiple key sequences (such as keying in a frequency string).

Now I don't feel like I'm being cheated by paying $25 where I thought a $2.50 part would work just as well!—*John Hansen, W2FS*

Notes

[1]Parallax, Inc, 3805 Atherton Road, #102, Rocklin, CA 95765; tel 888-512-1024. A wealth of information is available from Parallax at **http://www.parallaxinc.com**. A Basic Stamp II costs $49.95, plus shipping. Quantity and educational discounts are available.

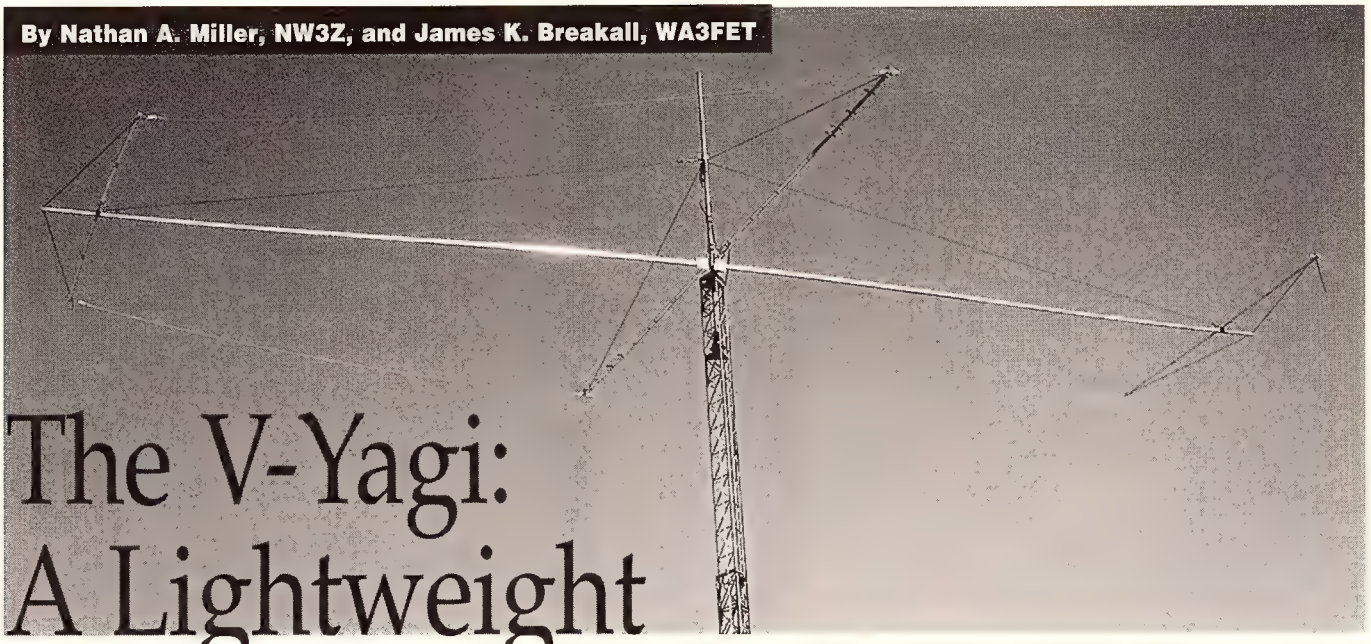
[2]A PC board for this project is available from FAR Circuits, 18N640 Field Ct, Dundee, IL 60118-9269, tel 847-836-9148 (voice and fax). Price: $5 plus $1.50 shipping for up to four boards. Visa and MasterCard accepted with a $3 service charge. This board requires the installation of one jumper (not indicated on the schematic) that is physically near U3 and is labeled **JUMPER**.

[3]Scott Edwards Electronics, PO Box 160, Sierra Vista, AZ 85636; tel 520-459-4802. The Scott Edwards DTMF Appkit is also available from Parallax. In each case, the price is $25.

[4]A partial kit is available for this project. It includes all of the parts that are not available at Radio Shack. This includes a Basic Stamp II programmed with the remote-base controller firmware, a CM8880 DTMF transceiver, a 3.58 MHz crystal and a 390 kΩ resistor. The kit is available for $99, US postage paid from John Hansen, W2FS, 49 Maple Ave, Fredonia, NY 14063. When ordering, please specify the call sign you want placed in the IDer and the two-digit password you want to bring up the unit.

[5]The source code file (*706STAMP.ZIP*) can be found on the Internet (ftp to **oak.oakland.edu/pub/hamradio/qst-binaries/**) and on the ARRL BBS 860-594-0306.

By Nathan A. Miller, NW3Z, and James K. Breakall, WA3FET



The V-Yagi: A Lightweight Rotatable Antenna for 40 Meters

Do you want a big signal on 40 meters without the hassle and expense of a large tower and rotator? This antenna uses wire parasitic elements to do the job with little weight, wind load or cost.

Monstrous full-sized three-element 40 meter Yagis are well beyond the reach of most people because they require a huge investment in towers, rotators and erection. These antennas typically suffer from very sharp bandwidths, although this problem has been overcome with the Optimized Wide-band Array (OWA) antenna developed by WA3FET and built by Tim Duffy, K3LR. By placing an extra director very close to the driven element, the SWR bandwidth is improved greatly. The improved bandwidth of this antenna comes at the price of an additional element, however, bringing the overall weight of the antenna to around 350 pounds!

For those on a tighter budget, there are more manageable "Shorty-Forty" antennas, which use loading coils, linear loading, or inductive stubs to shorten the overall element lengths, but which are filled with compromises. This class of antenna generally suffers from disappointingly narrow bandwidths, in addition to the losses and mechanical problems associated with trap and loaded antennas.

The V-Yagi is a computer-optimized Yagi antenna that combines the benefits of low weight, small wind load, excellent front-to-back (F/B) characteristics and the ability to instantly switch directivity by 180°. To minimize weight and wind load, the V-Yagi uses a single tubular element (the driven element) and #10 AWG wire for the two parasitic elements. Because of the unconventional construction, the overall weight and wind load are low enough that it can be mounted on a very light-duty tower with a similar rotator. The configuration of the parasitic elements actually increases the antenna's bandwidth to cover the entire band and exhibits no loading losses or other drawbacks associated with shortened antennas. Figure 1 shows the prototype antenna on a 50 foot crank-up tower.

The Sloped Parasitic Elements

To facilitate construction, the parasitic wires slope toward the driven element, where cross-members support their ends. The cross-members are electrically isolated from the antenna and do not contribute to its operation. Modeling with *NEC-4*[1] shows that sloping the parasitic elements does degrade forward gain slightly, but the technique actually improves SWR and F/B bandwidth. Figure 2 is a diagram of the antenna.

Directional-Pattern Switching

To accomplish directional pattern switching, both parasitic elements are constructed to be directors, with an inductive stub across the split center of each element. Remotely operated vacuum relays are placed across the parasitic-element center so that the center inductor is shorted and the element performs as a director, when the relay is closed. When the relay is open, the inductance appears across the element center, and the element performs as a reflector. A simple dc power supply and switch control the relays to provide instant pattern switching.

[1]Notes appear on page 40.

Figure 1 (above)—The V-Yagi in place on a 50 foot tower for tests at Penn State University (University Park, Pennsylvania)

Design and Construction

This antenna was computer designed using the most recent *NEC-4* and *NEC•OPT4D*[2] optimization software. We built the antenna directly from the computer model, and the prototype performs exactly as predicted. The driven element and boom were designed with the aid of *YagiStress*[3] software to determine the weight and sag of the element. There are two types of tubing in this antenna. The 2.500 and 2.250 inch OD tubing is extruded 6061-T6 alloy with 0.125 inch walls. All other tubing is drawn 6063-T832 alloy with 0.058 inch walls. The parasitic elements and stub inductors are constructed of #10 AlumaWeld aluminum-plated steel wire.

The Driven Element

Figure 3A shows the half-element, with tubing diameters above the element and exposed lengths below. The joints each overlap four inches (to allow for connection), except the junction of the 2.00 and

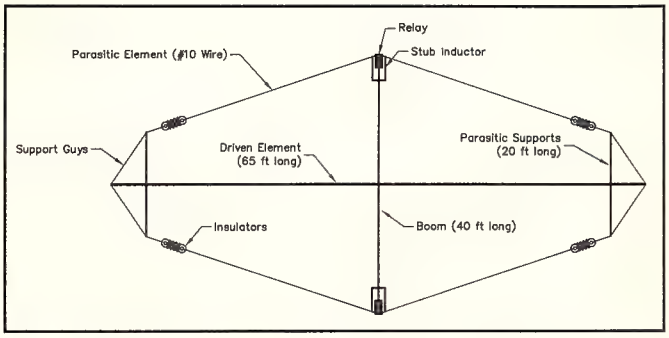


Figure 2—A diagram of the V-Yagi (not to scale).

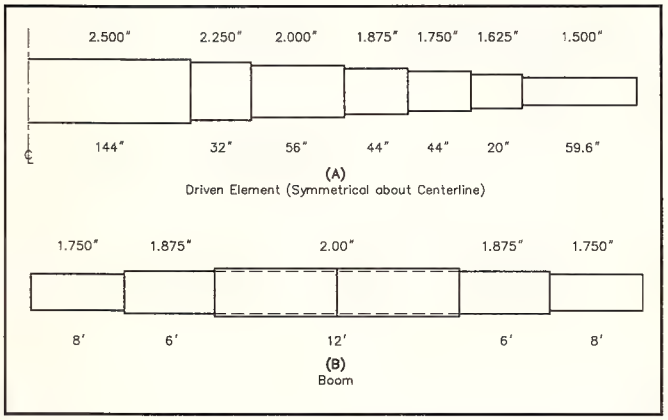


Figure 3—Taper schedules for the driven element (A) and boom (B). Numbers above the element are tube diameters. Numbers below the element are exposed tube lengths. See text for details of the tube-joint overlap.

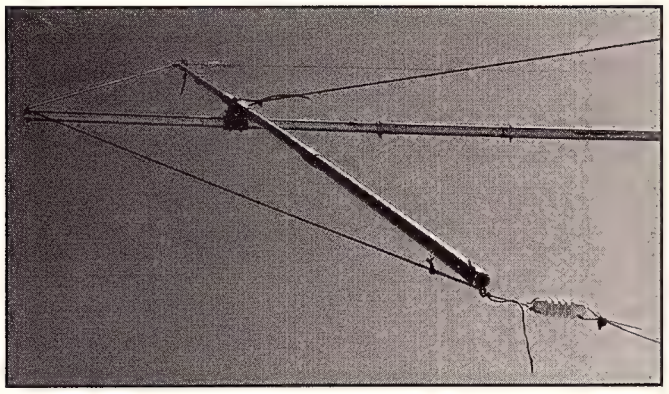


Figure 4—The parasitic-wire cross support, parasitic elements, horizontal and vertical support cables in place on the antenna.

1.875 inch OD tubing. To strengthen the element, the 1.875 tubing extends inside the entire length of the 2.00 tubing, effectively doubling the wall thickness of the 2.00 section. The total weight of the driven element as calculated by *YagiStress* is 47 pounds.

Each junction is coated with an anti-oxidant compound and secured with four aluminum rivets set 90° apart.[4] Once each element half is assembled, they are connected together and fastened to a mounting plate as discussed in the next section.

The center of the driven element must be isolated from the support mast and the boom. It must also be split for a direct feed. Two pieces of fiberglass tubing provide insulation and strength at the center of the element. A one-foot-long piece of fiberglass with a 2.250 inch OD is inserted inside the center of each element half while a two-foot-long piece of 3.00 inch OD fiberglass tubing is placed over the exterior of the junction. The two halves of the driven element are spaced three inches to prevent arcing during high power transmitting. The driven element is mounted onto the mast separately from the boom using a standard plate clamp and six stainless steel **U** bolts. A 5 kW, 1:1 current balun at the feed point matches the unbalanced coaxial feedline to the balanced element.

The Boom

One reason for the light weight of the V-Yagi is that the boom need only support the center of the wire parasitic elements and the stub inductors at each end. Although a conventional Yagi boom must support heavy tubing elements and is made of 3 inch or larger heavy-wall tubing, this boom begins with 2.00 inch OD aluminum and tapers to 1.75 inches at the tips. The boom is simple to construct and weighs only 20.5 pounds. It is mounted on the mast directly above the driven element by means of its own mounting plate. Figure 3B shows the complete boom.

The Parasitic Elements

The parasitic elements are each constructed in two halves; each half is 378.9 inches long (with insulators on each end). The measurement must be made from the boom tip (the geometric center of the element) to the outer insulator. The cross-members that support the outer ends of the parasitic wires must be isolated from the driven element and electrically broken into four equal segments to decouple them from the antenna. These members are made from 1.25 inch OD aluminum tubing. Where a cross-member is broken, a sleeve of 1.50 inch OD (1.25 inch ID) fiberglass tubing joins the segments. To minimize electrical coupling to the driven element, the gap between the aluminum pieces in the center of the cross support (where it attaches to the driven element) is 12 inches. The spacings between outer aluminum sections need only be about one inch. The parasitic support attaches to the driven element on the 1.50 inch tip section, 358 inches from the center of the element. The tip section is covered with a six-inch-long sleeve of 2.0 inch OD (1.5 inch ID) fiberglass tubing at the mounting point. A simple four **U**-bolt plate clamp is used to mount the support. With the fiberglass insulation in place, the cross support is isolated from the clamp, which is also isolated from the driven element, to reduce end-loading effects. Figure 4 shows the cross-member attached to the driven element, parasitic wires and support guys.

The Stubs and Relays

The inductive stubs are constructed from a shorted parallel-wire transmission line made of #10 AlumaWeld spaced five inches apart with fiberglass rods. To achieve the desired inductance, the stubs are 63.25 inches long and shorted at the inner end. The vacuum relays, which have a 7.5 kV, 12 A rating, are housed in small plastic boxes in the center of the stubs.[5] Wire leads connect the relays to the stubs at the same points as the parasitic element ends. Figure 5 shows the stub and relay assembly. The parasitic wires and relay box are at the bottom of the picture and the plate that shorts the stub end is at the top.

Support Guys

The weight of the cross supports requires that the driven element be vertically guyed for support. The guys stretch from the parasitic support attachment point on the driven element to turnbuckles fastened to the mast four feet above the driven element. Similar cables support the boom. They stretch from the tips of the boom to the turnbuckle attachment points and eliminate a small amount of boom sag. Horizontal support guys (shown in Figure 1) stretch from the driven element tip to the ends of the parasitic-wire cross supports, to counter the tension in the parasitic wires. All guys are nonmetallic Phillystran, a PVC-encased Kevlar rope, to ensure that there is no electrical interaction.

Mechanical Design of the Antenna

The design of the V-Yagi included no mechanical strength evaluation other than the *YagiStress* analysis for each element mentioned above. The antenna is built entirely "to feel" with regard to tubing sizes and member-support locations. Anyone needing to judge antenna wind and ice-load survivability should perform a detailed analysis of the

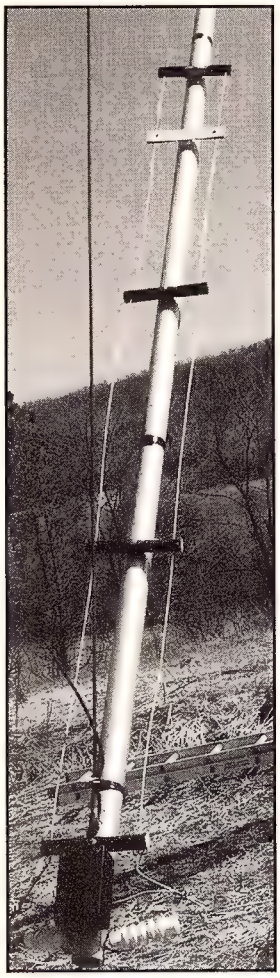


Figure 5—The inductive stub at the center of one parasitic element. The black (plastic) box at the bottom contains the relay.

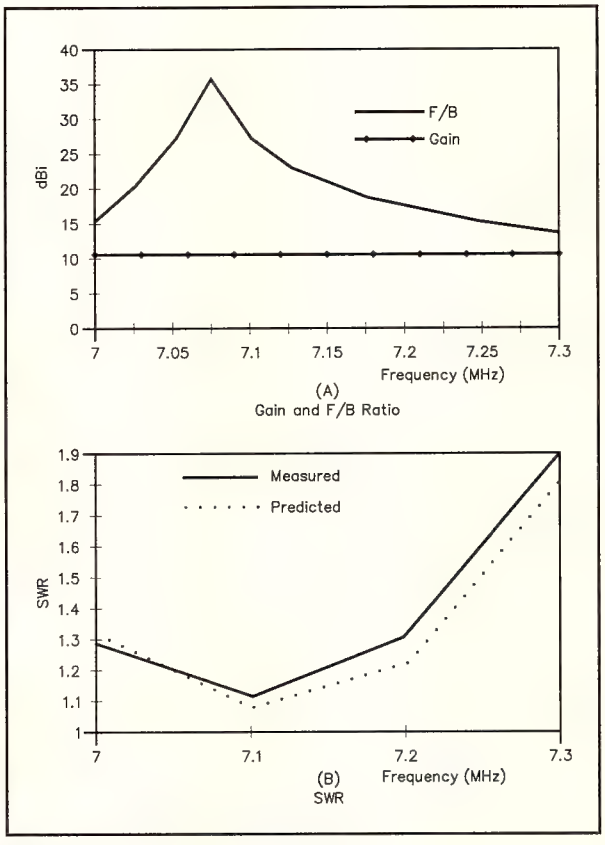


Figure 6—Gain, F/B and SWR plots.

antenna stresses and failure points.

Performance

The antenna was built and tested at the Penn State antenna test range, where it was mounted on a 50 foot crank-up tower, fed with 100 feet of low-loss coax and turned by a Telex/HyGain Tailtwister rotator. The antenna survived—without damage—a typical Penn State winter that shredded several low-band dipoles on other, taller, towers. The impressive F/B ratio of this antenna is easy to demonstrate by using the pattern-switching capability; F/Bs of approximately 40 dB were observed on many DX and stateside signals.

The antenna was modeled using *NEC-4* at a height of 50 feet over real ground. It has a take-off angle of 33° at this height, with forward gain greater than 10.1 dBi across the band and a predicted F/B response as shown in Figure 6A. The predicted feedpoint SWR is also compared to the values measured at the transmitter; the close match shown in Figure 6B indicates the accuracy of the computer model.

Summary

This antenna has excellent performance for its size and weight. The exceptional F/B is greatly enhanced by the pattern-switching capability. SWR is extremely low across most of the band; rising at the extreme top of the band. Due to the construction methods and ready availability of materials, V-Yagi cost is well under that of conventional Yagi antennas. Its low weight, cost and wind load make it practical for Amateur Radio operators who cannot afford larger, more-expensive towers, rotators and antennas that have only a minimal gain advantage.

Nathan Miller, NW3Z, has been extensively involved in the modeling and testing of HF antenna systems since 1994. Nathan was first licensed in 1989 and is a member of the Frankford Radio Club. He received a BS degree with honors in Electrical Engineering from Penn State University, University Park, Pennsylvania, in 1996 and is currently a graduate student. Upon completion of his MS degree in May 1998, he will be commissioned into the US Navy.

The optimization and testing of the V-Yagi was the result of his undergraduate thesis research. His funded research has involved the design and modeling of the antenna system for a UHF phased-array radar system and the design of feed systems for UHF parabolic dish antennas. Nathan is currently designing new monoband antennas the Penn State antenna test range for Tim Duffy's super-station, K3LR. Nathan is the "station engineer" for Penn State club contest efforts, K3CR. He is also working on several commercial Amateur Radio market designs, with WA3FET and K3LR, for a new line of HF antennas being manufactured by Butternut/Bencher. You can contact Nathan at 6274 Main St, Honey Brook, PA 19344; e-mail **nam109@psu.edu**.

Jim Breakall, WA3FET, has given numerous antenna-related talks at radio clubs and the Antenna Forum of the Dayton Hamvention and has contributed to several Amateur Radio articles. Jim was first licensed in 1965 and has been active in designing and building antennas, especially for his own and other Amateur Radio stations. He received BS and MS degrees in electrical engineering from Penn State University in 1975 and 1979, respectively, and a PhD in electrical engineering and applied physics from Case Western Reserve University, Cleveland, Ohio, in 1983.

He has done work at the National Astronomy and Ionospheric Center, Arecibo, Puerto Rico, from 1974 to the present and has been involved in several EME operations and even some contacts on 80 meters from the 1000 foot dish antenna. From 1983 to 1988 he was a Project Engineer with the Lawrence Livermore National Laboratory, Livermore, CA where he helped develop and validate the Numerical Electromagnetics Code (NEC), which is now used in ham and professional antenna modeling software. From 1988 to 1989 he was an Associate Professor in the Electrical and Computer Engineering Department at the Naval Postgraduate School, Monterey, California, and was a member of the K6LY club there. He is presently a Professor in the Electrical Engineering Department at Penn State University, and has graduated many MS and PhD students who have mainly worked on antenna projects. At Penn State, Jim has had numerous research projects for the US Navy and other government and industrial organizations, mainly concerned with antenna modeling and propagation. He has received a US patent for an invention called the Three-Dimensional Frequency-Independent Phased-Array (3D-FIPA).

Most recently, he and his students have been building a large antenna range (to test new designs competitively) with many tall commercial-grade towers available. He is the faculty advisor and station trustee for the Penn State Amateur Radio Club, K3CR. He has started to build a contest station at his farm in Puerto Rico (near Arecibo) and looks forward to many operations there from KP4. You can contact Jim at 264 Lutz Ln, Port Matilda, PA 16870; e-mail **jkb1@psu.edu**.

Notes

[1] *Numerical Electromagnetics Code (NEC-4)*, Lawrence Livermore National Laboratory, 1992. *NEC-4* is licensed by the laboratory, for information e-mail **burke2@llnl.gov.** Earlier versions are available. For sources of those versions and pertinent information, look at **http://www.dec.tis.net/~richesop/nec/execfile.htm.**

[2] NEC•OPT *Antenna Design and Optimization Software System*, Paragon Technology, Inc, 1994. This software is no longer available.

[3] *YAGISTRESS Antenna Structural Modeling Software*, Ver. 1.53, 1992. The author is Kurt Andress, NI6W, 1581 Shirley St, Minden, NV 89423.

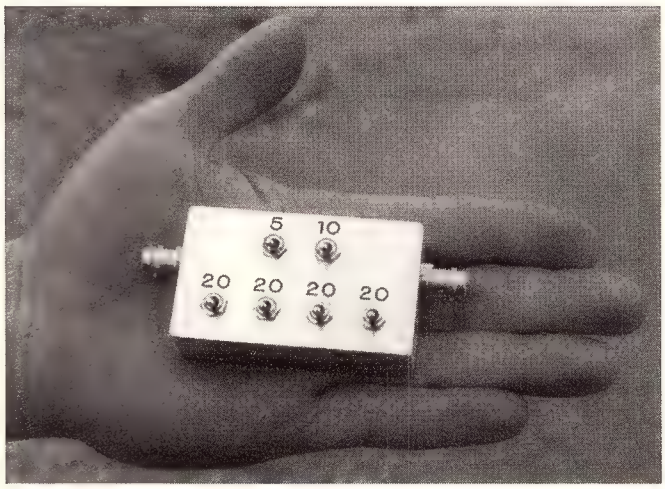
[4] David B. Leeson, W6QHS, *Physical Design of Yagi Antennas*, (Newington: ARRL, 1992), Order No. 3819. ARRL publications are available from your local ARRL dealer or directly from ARRL. Mail orders to Pub Sales Dept, ARRL 225 Main St, Newington, CT 06111-1494. You can call us toll-free at tel 888-277-5289; fax your order to 860-594-0303; or send e-mail to **pubsales@arrl.org**. Check out the full ARRL publications line on the World Wide Web at **http://www.arrl.org/catalog**.

[5] Surplus vacuum relays are often available from Fair Radio Sales Company Inc (PO Box 1105, Lima, OH, 45802-1105; e-mail **fairadio@wcoil.com**; URL **http://alpha.wcoil.com/~fairadio/**) and GNP Sales (PO Box 77011, San Francisco, CA 94107; tel 415-884-3165; e-mail **rgerba@crl.com**). QST

By Pete Ostapchuk, N9SFX

A Rugged, Compact Attenuator

This attenuator is worth your attention. Built like the proverbial brick outhouse, it's one you can easily duplicate!



PHOTOS BY MIKE MCCAULEY, WN9NDU

After becoming a ham in 1993, I soon realized the value of being able to locate a transmitter by radio-direction finding (RDF or "DFing"). One of the first purchases I made while awaiting my license was a 13 element, 2 meter Yagi antenna. I bought the antenna so I could work the more-distant repeaters, but it soon came in handy for DF work: The Elkhart County Radio Association's (ECRA) 2 meter repeater was suffering an enormous amount of malicious interference. Mike McCauley, WN9NDU, then the club president, appointed me Interference Committee chairman. I was one of the few members with a beam antenna—and everyone else had a life.

Background

Some H-T S meters have a scale of S9 + 40. From that, you might think that you have an S-meter range of 94 dB, but you'll find that most H-T S meters likely have a range of from 6 to 15 dB. (The graduations apparently are window dressing put there by somebody in marketing.)

When you're DFing and head off to find the source of the signal, you'll likely take along a small "fox-hunting" Yagi with four or five elements. Eventually you'll get close enough to the transmitter so that you get a full-scale S-meter reading no matter which way you point your antenna. Are you dead in the water? Not if you have an RF attenuator! Simply insert the attenuator between your antenna and radio and select a value of attenuation that puts the S-meter needle into the active region, then continue with the hunt. Increase the attenuation as you get closer to the fox so that you never quite get a full-scale reading as you rotate your antenna through 360°.

This Design

I've seen 65-dB attenuators sell for as much as $400, but with some scrupulous switch shopping, you can put this attenuator together for $50. It's an ideal first project. No power supply is needed, no active components are used, there are no coils to wind and there's no PC board to etch. In three hours, you can assemble the unit and dc-test it with a voltmeter. Best of all, even though you built it yourself, it

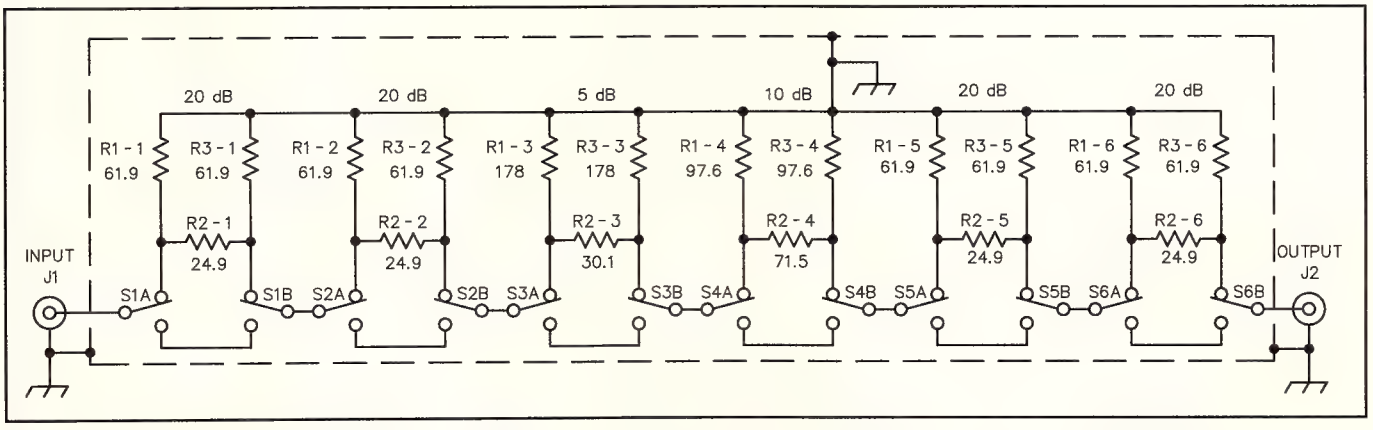


Figure 1—Schematic of the attenuator. Equivalent parts can be substituted. Unless otherwise specified, resistors are 1/4 W, 1% tolerance film or carbon-composition units.

J1, J2—BNC connector
S1-S6—DPDT toggle switch, 120 Vac, 5 A (see text); C&K 7201 MDZBE, Alcoswitch MTF 206N and other suitable switches are available from Newark Electronics, 4801 N Ravenswood Ave, Chicago, IL 06040-4496; tel 800-463-9275; 312-784-5100; fax: 312-907-5217, **http://www.newark.com.**

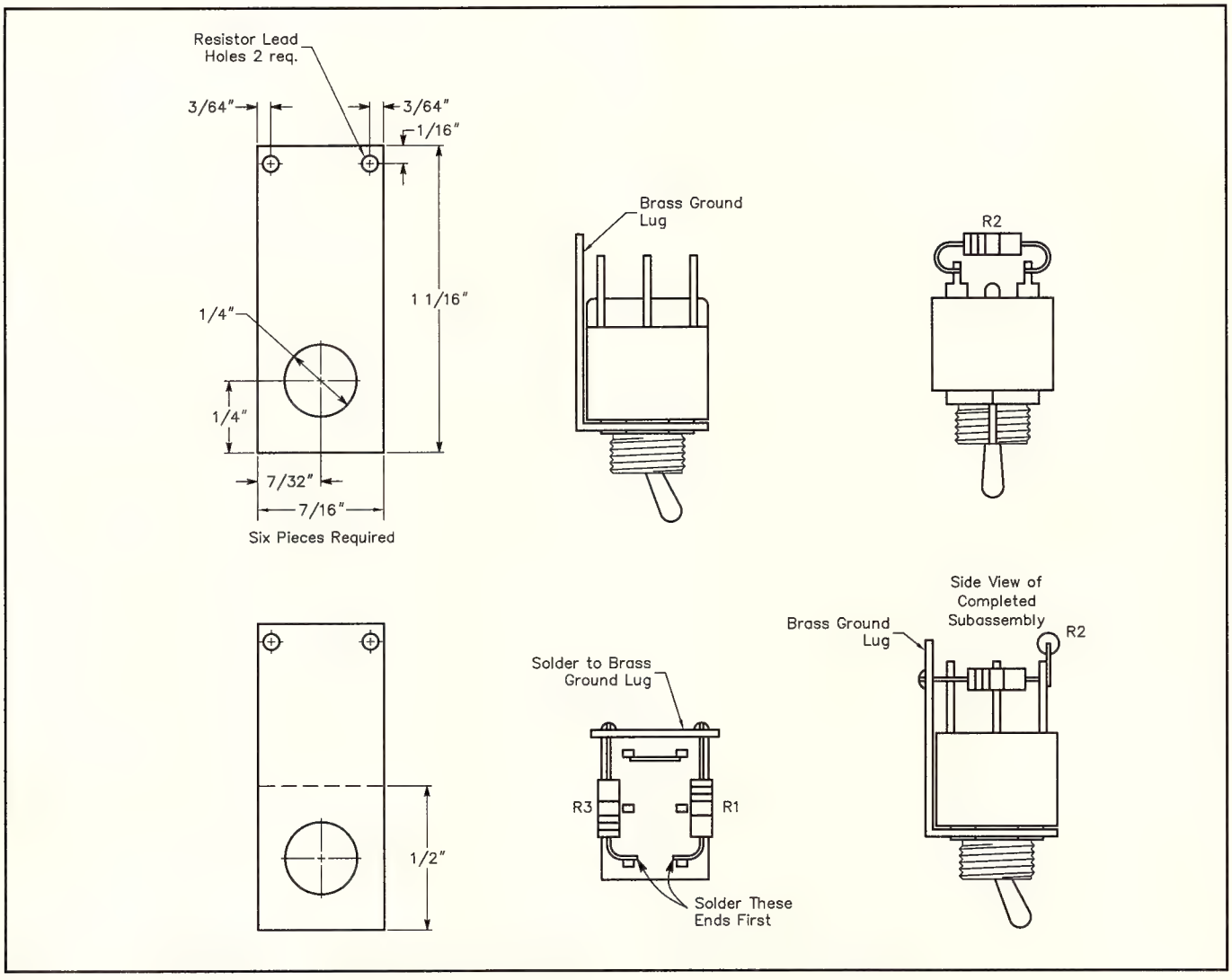


Figure 2—Preparation of the brass grounding strip and assembly of the individual attenuator sections.

won't look like you did!

I chose a 95 dB limit for my attenuator. Why? Because going much beyond that (an attenuation of 95 dB is a power ratio of 3,162,277,660 to 1) is like trying to keep your soda cold while visiting friends on the Sun! For this attenuator, I chose steps of 5, 10, 20, 20, 20 and 20 dB. By limiting the attenuation steps to no more than 20 dB, the unit works well up to 450 MHz.[1]

To allow an attenuator to work with any radio that you want to use for fox-hunting, the smallest attenuation step should be 5 dB. With the increments I've chosen, you can select attenuations from 0 to 95 dB in 5 dB steps. The physical switch arrangement allows you to use the attenuator in total darkness. This is an important consideration because most H-Ts are backlit, attenuators are not.

The 1997 ARRL Handbook's resistive attenuator table (page 30-30) provided the resistor values needed to obtain the desired attenuation steps while maintaining a 50 Ω impedance. For ease of construction, I chose to use pi networks (see Figure 1).

Although we were told not to use miniature toggle switches, we found they work well. We were told to use carbon-composition resistors (good luck finding them nowadays!), but the RN55 1/4 W, 1% tolerance metal-film resistors available from Digi-Key work well and offer a great selection of resistor values.

A Pilgrim's Progress

My first attenuator attempt was a dismal failure. One sentence in the *Handbook* that reads "Good shielding between each attenuator section is essential," went right over my head. My second attempt was a dismal success. It worked, but it was too time-consuming to build because of all the sheet-metal bending, fitting and mounting required. My third attempt involved machining a solid block of 6061-T6 aluminum to provide chambers in which to mount the switches and resistors. This, too, is labor-intensive, but the end result looked so good that I didn't care! (I know—some of you are muttering that you don't have a vertical milling machine, but don't worry; I don't expect you to make your own toggle switches either! I'll get to that later.)

The next question was "Does it work?" I turned to Dave Evans, AA9DG, the trustee of the ECRA 2-meter repeater. Dave has a masters degree in electrical engineering. He is as logical as Mr Spock, but has a sense of humor. More importantly, he is employed by a manufacturer of audio equipment and broadcast transmitters. That explains why I turned to Dave in the first place: He could evaluate the attenuator and I wouldn't have to buy $10,000 worth of test equipment! During tests, we found that the two resistors that connect to ground in each pi network should be located on opposite sides of a chamber, touching—or almost touching—the aluminum partitions to minimize crosstalk and attenuation roll-off at higher frequencies.

A Solid Enclosure

About that machined enclosure I mentioned earlier:[2] I had aluminum bar stock

1Notes appear on page 43.

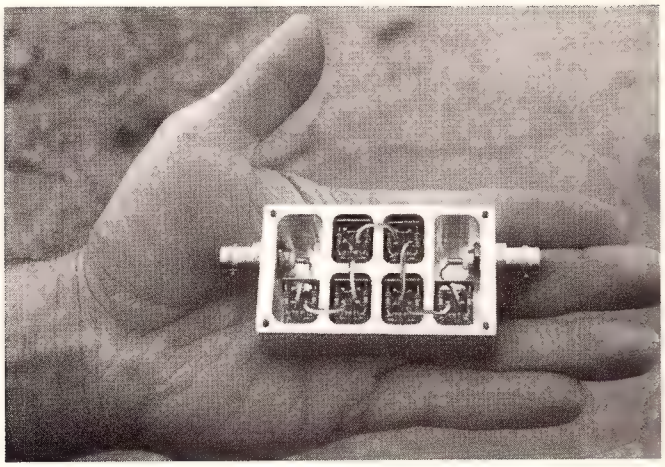


Figure 3—An inside view of an assembled attenuator.

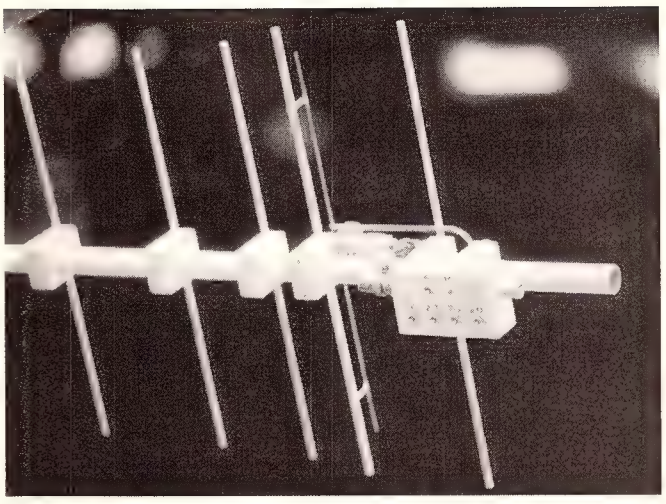


Figure 4—Here, the attenuator is shown attached to a portable fox-hunting antenna.

for the attenuator enclosure, but I needed to cut it to size and then send it off for CNC machining. Marty, KB9OYL, who got her license in 1996, said that she'd like to try building Amateur Radio equipment. Having no military background, she never learned Rule Number 1: Never Volunteer, so I put her to work machining the aluminum blanks to size. I told her that one finished unit would be hers, so she made no mistakes. When Marty finished, we went to see a friend, Bud Kramer, who specializes in CNC machining, and got a CNC education. Afterward, we visited Jerry Wood, who has a CNC engraving machine. I spoke those words that nobody wants to hear, "Remember when I helped you . . . ?" Jerry did a splendid job of engraving the attenuation value at each switch position. I filled in the numbers with black paint to make them stand out better. (See the title photo.)

As you can probably guess, this project made me a firm believer in the old saying, "It's not *what* you know, it's *who* you know!"

Construction

I used miniature toggle switches with a 1/4-inch-diameter bushing and a 0.4 VA maximum rating. My first attenuator was built with generic toggle switches and is still working fine after two years. The unit shown here uses C&K switches. Denny, KA9WNR, had some C&K 7201s at a good price ($1 each!). These switches have gold-plated contacts for reliable dry switching. Their terminals are arranged for right-angle PC board mounting, but a few minutes with pliers and side cutters yields switches well-suited for the job. The switch has a short (1/4 inch) bat handle that makes it less apt to get snagged and switched accidentally. It looks better, too, because the attenuator is quite small. The C&K 7201 is not my first choice because of the terminal arrangement (and the new price is about 10 times what I paid for them), but the switches' specifications will put you in the ballpark when you go shopping for switches.

I don't care if you have a thermonuclear soldering iron, don't even think about soldering the resistors to the aluminum enclosure!—it's small (7/8×1 3/4×3 inches), but it's quite stout. I put a bare enclosure (backed up by a 2×4 piece of lumber so as not to mar the case finish) in my hydraulic press. By the time the pressure got to 14,000 pounds, the enclosure was buried in wood fragments—without damage. (Don't try this at home.)

Refer to Figure 2. To ease assembly, cut six strips of 0.01 to 0.02-inch-thick brass shim stock to 7/16 ×1 1/16 inch. Punch a 1/4-inch-diameter hole in each strip at one end, and two holes in the corners at the opposite end. The corner holes are just big enough to allow the resistor leads to pass. Scribe a line 1/2 inch from one end of each strip and bend the strip 90°. Mount each strip on a switch using a single bushing nut. Using some component-lead scraps or bare wire, connect together one pair of terminals at an end of each of the switches. (These are the bypass connections.) Next, solder in place the two resistors (R1 and R3) of each network that connect to ground passing the ground lead of each resistor through the corner holes in the brass strip. Form each section's third resistor (R2) and solder it in place. Now, you can drop each resistor/switch assembly into place and secure them with a second bushing nut, which also grounds the brass clip. Once all the subassemblies are mounted, interconnect them with insulated #24 stranded hook-up wire. This construction approach allows easy disassembly of each section in the event you loaned the attenuator to an ex-friend who used it to reduce the power of his 50 W radio to 5 W.

For the input and output connectors, J1 and J2 (which can be used interchangeably), I use BNC connectors with a threaded (3/8-32) bushing and nut. You can locate the connectors on the enclosure ends, as shown in Figure 3 and other photos, or on the top, front, or any combination of these. Other connector types can be used for other applications, but BNC connectors are quite common on H-Ts, and H-Ts are well-suited to fox-hunting. The attenuator is small enough to be secured to the boom of a fox-hunting antenna (see Figure 4).

Summary

Now our interference committee has a bunch of compact and rugged attenuators–and you'll eventually have at least one. I hope you'll enjoy building this project and have many successful fox-hunts. If you've already spent the money for an H-T and you're tired of interference to your repeater, you can now "Hang 'em High" for "A Few Dollars More."

Peter ("Pete") Ostapchuk, N9SFX, has always had a fascination with electrical, electronic and mechanical gadgets. In high school, his physics teacher was Stan Rohrer, W9FQN. After high school, following an offer he couldn't refuse, Pete spent three years in Germany as a guest of the US Army working as a radar and computer operator. While still in the Army in 1968, he bought his first ARRL Handbook. *From that* Handbook, *Pete built his first QRP transmitter in 1970, but wasn't licensed until 1993 because of the Morse code requirement. Once he applied himself, he went from 0 to 20 WPM copy in six months, and within a year, went from no license to Extra Class. Pete's wife, Linda, is KB9RUC. His daughter, Sarah, N9ZZT, is a junior at Purdue University and hopes to become an astronaut. You can contact Pete at 59425 Apple Rd, Osceola, IN 46561; e-mail* ***devans@skyenet.net.***

Notes

[1]Verified in the ARRL Lab.

[2]Enclosures are available from me for $21 each, plus $5 each for shipping and handling. Contact me by telephone at 1-219-679-4627 from 8:00 AM to 11:00 PM. You'll have a better chance of reaching me in the morning or during the evening. Or, send a self-addressed stamped envelope to Pete Ostapchuk, N9SFX, 59425 Apple Rd, Osceola, Indiana 46561. I would like to hear your comments about the attenuator.

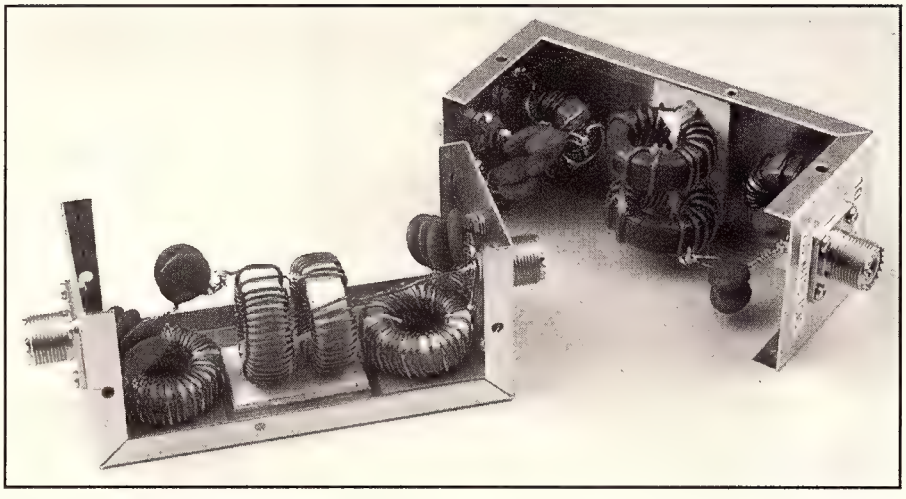
By Ed Wetherhold, W3NQN

Clean Up Your Signals with Band-Pass Filters

Part 1—These inexpensive, easily built filters can be the buffer you need between the signals you want to hear and send and those you don't!

In January 1996, Tim Duffy, K3LR, chief operator of one of the top-three-ranked multi-multi contest stations, contacted me. Tim asked me to design a series of band-pass filters (BPFs) that he could use between his 150 W transceivers and 1500 W amplifiers. He wanted to reduce the transfer of harmonics and broadband phase noise to the amplifiers. The filters would also make the transceivers, when receiving, less susceptible to overload from the adjacent-band transmitters. This project is the result of my efforts in designing, constructing and testing BPFs for six amateur bands—160, 80, 40, 20, 15 and 10 meters.

These filters provide a level of selectivity and reliability unachieved in currently available filters—including commercial units.This performance is obtained by employing a three-resonator filter configuration using inductors wound on powdered-iron or phenolic toroidal cores, and series-parallel connected, high-voltage, low-loss NP0 ceramic capacitors. If you're a contester (especially one who's involved in multi-multi contesting and ARRL Field-Day activity), these filters are what *you* need![1] (*Editor's note:* You don't have to operate multi-multi to reap the benefits of these filters. Do remember that these are *single-band* filters and must be switched appropriately when changing bands or you'll let the smoke out.)



An inside view of 160 meter and 10 meter BPFs housed in 2¼×2¼×5-inch (HWD) boxes equipped with SO-239 connectors at each end. With the exception of the 10 meter BPF, the filters are now housed in slightly larger boxes—2⅛×3×5¼-inch (HWD)—to lessen component crowding and minimize response degeneration when the cover is installed.

Background

Multiple-transmitter interference was discussed recently by Thomas Moliere, DL7AV, in his *CQ Contest* article.[2] Tom's article is an excellent list of the many interference sources common to this type of operation. Multiple-transmitter operation at a single site creates an unusual RF environment that results in many unexpected interference problems not normally encountered with single-station setups. For example, in addition to transmitter harmonics, there can be receiver blocking and damage, and the generation of harmonics and intermodulation at the nonlinear receiver input. Tom's article shows how the addition of 1500 W, high-power, low-pass filters at the transmitter's outputs proved helpful. Here, I'll concentrate on filters designed to be placed *between a transceiver and the input to a high-power amplifier*. The advantage of this approach is that the filters can be constructed using standard, readily available components for an ICAS power level of 200 W. (This is not the case for filter components required for use at a power level of 1500 W.)

A recent *QST* harmonic-attenuation BPF article describes a three-resonator design.[3] Although the BPF performance is satisfactory, it is limited to a power level of 100 W, and the L1 and L3 reactances are too low for good Q. Also, the design information is limited, so readers can't confirm the author's designs and try others. Another *QST* project[4] uses capacitively coupled input and output resonators. The omission of a series inductor in the coupling circuit, however, results in poor stopband attenuation above the upper cut-off frequency. A commercially available BPF used by many multi-multi contesters also exhibits similar poor, high-frequency attenuation.

The new BPFs provide for higher-power handling, increased reliability and greater attenuation. To help you evaluate many different designs and select the most-promising ones for trial, I've included a 62-line BASIC program[5] that allows you to change component values and explore the resultant effect on the BPF bandwidth, return loss and stopband attenuation.

Band-Pass Filter Design

I selected a three-resonator Chebyshev

[1]Notes appear on page 48.

Table 1
Tabulation of 160 Meter Band-Pass Filter Parameters for TR=4, Z(Ω)=800

F-C	−FAp (MHz)	+FAp	BW 3 dB (%)	F−	35 dB (MHz)	F+	RL (dB)	RC (%)	C1, C3 (pF)	C2 (pF)	L1, L3 (μH)	L2 (μH)	X_L1 (Ω)
1.87	1.75	1.99	27.4	1.16		3.02	30.0	3.15	440	250	16.46	28.97	193
1.87	1.74	2.01	28.1	1.15		3.03	27.7	4.12	440	260	16.46	27.86	193
1.87	1.73	2.02	28.8	1.15		3.05	25.8	5.11	440	270	16.46	26.83	193
1.87	1.72	2.03	29.4	1.14		3.07	24.3	6.11	440	280	16.46	25.87	193
1.87	1.71	2.04	30.0	1.13		3.09	22.9	7.13	440	290	16.46	24.98	193
1.87	1.70	2.05	30.7	1.13		3.11	21.8	8.15	440	300	16.46	24.15	193
1.87	1.75	2.00	27.2	1.17		3.00	28.6	3.70	450	250	16.10	28.97	189
1.87	1.74	2.01	27.9	1.16		3.01	26.6	4.70	450	260	16.10	27.86	189
1.87	1.73	2.03	28.5	1.15		3.03	24.8	5.72	450	270	16.10	26.83	189
1.87	1.72	2.04	29.1	1.15		3.05	23.4	6.76	450	280	16.10	25.87	189
1.87	1.71	2.05	29.8	1.14		3.07	22.2	7.80	450	290	16.10	24.98	189
1.87	1.70	2.06	30.4	1.13		3.08	21.1	8.85	450	300	16.10	24.15	189

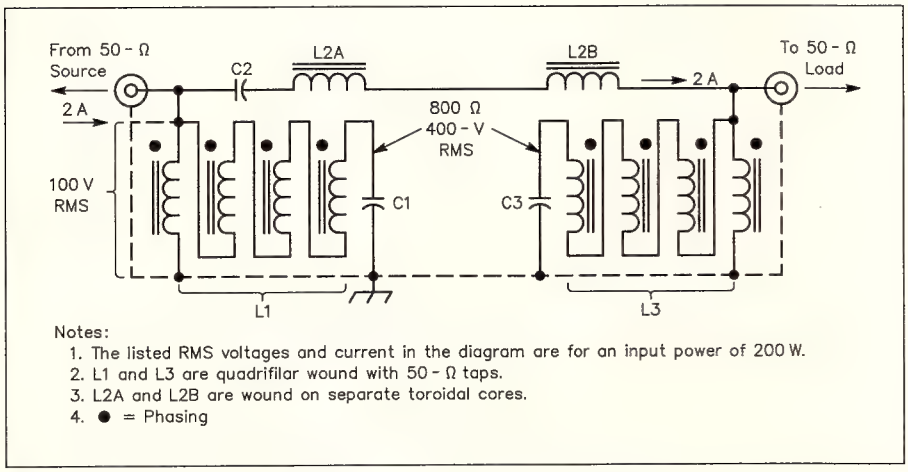


Figure 1—Schematic of a three-resonator band-pass filter (BPF). L1 and L3 are *quadrifilar* wound and equipped with a 50-Ω tap point. L2A and L2B are wound on separate toroidal cores. The RMS voltages and currents shown represent a filter input power of 200 W.

BPF for use on the six bands (see Figure 1). This filter is a satisfactory compromise between adequate selectivity and acceptable complexity. The filter consists of input and output parallel-tuned shunt resonators with their tops initially coupled by a series-tuned resonator. The resonators, capacitors and inductors are numbered from left to right as 1, 2 and 3.

Component Values

Resonators 1 and 3 have identical component values. To minimize the component-value spread to less than 3.6 to 1, the filter impedance is made 450 or 800 Ω, and the input and output shunt inductors tapped appropriately to obtain 50 Ω. This allows L1 and L3 to have a reactance of more than 100 Ω, assuring a reasonable Q. By comparison, the three-resonator BPF designs in the September 1988 *QST* article (see Note 3) have L1 and L3 reactances of only 25 Ω.

Winding Type and Inductance Value

Figure 1 is the basic circuit for all the filters, but shows the *quadrifilar-wound* inductors used in the 160, 40, 15 and 10 meter BPFs. Although a quadrifilar winding is generally preferred for all designs to minimize component value spread, inductance-value limitations with the quadrifilar winding prevent using that configuration for the 80 meter filter. On that band, *trifilar windings* are used for L1 and L3. *Trifilar windings* were also used in the 20 meter BPF because they give an attenuation maximum at the second harmonic frequency of the 14-MHz signal.

Using a trifilar or quadrifilar winding means that a particular inductance value cannot be obtained by simply adding or removing one or two turns. Instead, any turns added or removed must be done *as multiples or submultiples* of three or four turns to maintain the trifilar or quadrifilar configuration. This winding limitation makes it more difficult to obtain a particular inductance value. In spite of this, the trifilar and quadrifilar windings are preferred because much better interwinding coupling results over the entire inductor. This provides a correspondingly greater stopband attenuation than is possible with the more common progressive winding.

Achieving a 50-Ω Tap

The taps on L1 and L3 are used as the input and output connections to the filter and should be terminated in a 50 Ω impedance. (These taps also serve as the final connection points for the series-resonant circuit of C2 and L2.) Because the impedance of an inductor varies as the square of turns, the input/output tap is placed at a point having $^1/_3$ or $^1/_4$ of the total number of turns so that the tap impedance is $^1/_9$ or $^1/_{16}$ of the total impedance. For example, on a trifilar-wound inductor of a 450 Ω resonator, the impedance at the $^1/_3$ tap is $450/3^2 = 50$ Ω. The impedance at the $^1/_4$ tap of a quadrifilar-wound inductor of an 800 Ω resonator is $800/4^2 = 50$ Ω.

Calculating BPF Component Values

I'll use the calculation of the 160 meter filter components as an example of the procedure followed to design all the filters. First, a preliminary design is made to find trial component values, then the BASIC program (see Note 5) is used to evaluate a number of designs using a range of C1 and C2 values near the trial C1 and C2 values. The most-promising design is assembled and tested. If its performance is satisfactory, the design is accepted.

To calculate the preliminary 160 meter BPF component values, I use the procedure described in *The ARRL Handbook*.[6] Because the 160 meter bandwidth is 0.20 MHz, I first design a 50 Ω Chebyshev low-pass filter having a ripple cut-off frequency of 0.28 MHz, slightly greater than the actual bandwidth. (A Chebyshev filter has many possible designs and is preferred to a Butterworth, which has only one possible design.) To minimize reflective losses, I use a return loss greater than 22 dB.

Referring to *Handbook* Table 16.2, the normalized component values associated with N = 3 and RL = 26 dB, where C1, C3 = 0.6292 F and L2 = 0.9703 H, are used to calculate a C-in/out low-pass filter having a cutoff frequency of 0.28 MHz. The capacitive and inductive *scaling factors* based on a 50 Ω filter are 11368×10^{-12} and 28.421×10^{-6}, respectively. Multiplying the normalized C and L values by the respective scaling factors gives C1, C3 and L2 values of 7153 pF and 27.58 μH, respectively.

Table 2A

Parameters for 160, 80, and 40 Meter Band-Pass Filters

Parameters/Band (MHz)	*160 Meters (1.8 - 1.94)*	*80 Meters (3.5 - 3.91)*	*40 Meters (7 - 7.3)*
Fc, BW (MHz), %BW	1.870, 0.120, 6.42%	3.700, 0.410, 11.1%	7.150, 0.300, 4.20%
F-Ap$_{-}$$_{+}$BW Ap (MHz)	1.753, 1.995, 0.242	3.366, 4.067, 0.701	6.740, 7.584, 0.844
RL (dB), RC%,	30.0, 3.15%	22.8, 7.22%	30.2, 3.08%
3-dB BW (MHz) and %BW	0.5128, 27.4%	1.174, 31.7%	1.801, 25.2%
Calc freqs (MHz) @ 35 dB	1.16, 3.02	2.18, 6.27	4.60, 11.1
L1,L3; Q_u & X_L @ Fc	16.46 µH, 195, 193	4.93 µH, 170, 115	3.96 µH, 150, 178
Core & A_L (nH/N2)	T130-6, 9.6	T130-17, 4.0	T130-17, 4.0
Total wire turns and gauge	40: 10 #16, 30 #18	33: 11 #16, 22 #18	28: 7 #16, 21 #18
No. and type of turns	10 quadrifilar	11 trifilar	7 quadrifilar
Wire lengths (inches) and gauge	17.5 #16; 45.7 #18	19 #16; 34 #18	13 #16; 33 #18
L2(µH), Q & X_L @ Fc	28.97, 320, 340	11.94, 250, 287	8.26, 220, 371
L2a and L2b (µH)	14.8, 14.2	5.97, 5.97	4.13, 4.13
No. turns (a, b) and core type	39, 38 on T130-6	37, 37 on T130-17	30, 30 on T130-17
Wire lengths (inches) and gauge	60 and 59, #18	58 and 57, #18	47 and 48, #18
C1, C3 (pF)	440=110 p 110 p 110 p 110	375=110 p 110 p 110 p 30 p 15	125=(220 s 220) p 15
C2 (pF)	250=110 p 110 p 30	155=31 p 31 p 31 p 31 p 31	60=30 p 30
C1/C2 Ratio	1.76	2.42	2.08

Notes

In the C1 and C3 capacitance declarations, a *p* or an *s* indicates that two or more capacitors are connected in *parallel* or *series*, respectively, to obtain the design capacitance value (ie, 30 p 30 means two 30 pF capacitors are connected in parallel (60 pF total); 15 s 15 means two 15 pF capacitors are connected in series (7.5 pF total).

The 110, 30 and 15 pF capacitors are Tusonix NP0 10% disc ceramics with voltage ratings of 2, 3 and 4 kV, respectively. The 220 pF disc ceramic capacitors are Ceramite NP0 5% 1 kV, type 10TCCT22.

Toroidal cores are Micrometals T130-6 (yellow) or T130-17 (blue/yellow).

L1 and L3 are tuned by injecting a signal at the center frequency into the 50 Ω tap through a 2.2 kΩ resistor. A 50 Ω detector is coupled to the inductor with a one-turn loop and the inductor turns are adjusted for a maximum signal level indication on the detector output meter.

For tuning L2, the assembled filter is terminated at one end with a 50 Ω load while the other end of the filter is connected to a return loss bridge. While monitoring the detected output of the return-loss bridge with an oscilloscope, adjust the L2 windings for an optimum return-loss response over the filter passband.

Table 2B

Parameters for 20, 15 and 10 Meter Band-Pass Filters

Parameters/Band (MHz)	*20 Meters (14 - 14.4)*	*15 Meters (21 - 21.45)*	*10 Meters (28 - 29.7)*
Fc, BW (MHz), %BW	14.88, 2.38, 16%	21.22, 0.450, 2.12%	28.84, 1.70, 5.89%
F-Ap$_{-}$$_{+}$ BW Ap (MHz)	13.74, 16.12, 2.38	20.43, 22.04, 1.605	27.18, 30.60, 3.424
RL (dB), RC%	27.3 4.34	35.1, 1.75	24.4, 6.01
3 dB BW (MHz) and %BW	4.59, 30.9%	4.057, 19.1%	6.035, 20.9%
Calc freqs (MHz) @ 35 dB	8.79, 25.2	15.0, 30.0	20.1, 41.3
L1, L3; Q_u, and X_L @ Fc	1.27 µH, 140, 119	1.053 µH, 120, 140	0.761 µH, 100, 138
Core and A_L (nH/N2)	T130-17, 4.0	T130-0, 1.50	T106-0, 1.90
Total turns and gauge	15: 5 t #15, 10 t #15	20: 5 t #16, 15 t #16	16: 4 t #16, 12 t #16
No. and type of turns	5 trifilar	5 quadrifilar	4 quadrifilar
Wire lengths (inches) and gauge	10.2 and 17.8 15	10 #16; 25 #16	8 #16; 19.6 #16
L2 (µH), Q_u and X_L @ Fc	3.18, 220, 297	3.75, 180, 500	2.36, 130, 428
L2a and L2b (µH)	1.70, 1.48	1.87, 1.88	1.10 and 1.26
No. turns (a, b) and core type	18, 17 on T130-17	19, 19 on T130-17	14, 15 on T130-17
Wire lengths (inches) and gauge	30, 28.5 #16	31.0, 31.0,#16 green	23.5, 25.1, #16
C1, C3 (pF)	90(30 p 30 p 30)	53.4=(100 s 100) p (6.8 s 6.8)	40.0=(15 p 15) p (20 s 20)
C2 (pF)	36(30 p 30 p 30)s (30 p 30)	15=(15 p 15) s (15 p 15)	12.9=[(15 s 15) p 15] s (15 p 15)
C1/C2 ratio	2.5	3.56	3.1

Notes

In the C1 and C3 capacitance declarations, a *p* or an *s* indicates that two or more capacitors are connected in *parallel* or *series*, respectively, to obtain the design capacitance value (ie, 30 p 30 means two 30 pF capacitors are connected in parallel (60 pF total); 15 s 15 means two 15 pF capacitors are connected in series (7.5 pF total).

The 15 and 30 pF capacitors are Tusonix, NP0, 10% disc ceramics with a 3 and 4-kV voltage rating, respectively. Other capacitors are CeraMite, NP0, 5%, disc ceramics rated at 1 kVDC @ 300 VAC RMS.

All cores are Micrometals T130-17, T130-0 or T106-0.

See notes of Table 2A for the suggested tuning procedures.

The 50 Ω low-pass filter is transformed into a band-pass filter by resonating C1, C3 and L2 at 1.87 MHz, the geometric center frequency of the band-pass filter. For example, L1 and L3 = 25330/((F^2)×C1), and C2 = 25330/((F^2)×L2), where F, C and L are in megahertz, picofarads and microhenries, respectively. The three-resonator BPF has shunt input and output parallel-tuned resonators with C1 and C3 = 7153 pF and L1 and L3 = 1.013 µH; the series-tuned resonator has C2 and L2 values of 262.6 pF and 27.58 µH. Although this BPF has the desired theoretical response, the design is *not optimum* because of the wide spread in the ratio of the C1 and C2 values. For example, the ratio of C1/C2 = 27. At the center frequency, the reactances of C1 and C3 and L1 and L3 are only 11.9 Ω; this is too low a reactance to obtain a reasonable Q. In comparison, the C2 and L2 reactances are satisfactory at 324 Ω, where a satisfactory Q is much easier to achieve.

To improve the Qs of the C1 and L1 and C3 and L3 shunt resonators, and to reduce the component-value spread, the impedance of the shunt resonators can be raised

by a factor of 4, 9 or 16, to 200, 450 or 800 Ω, respectively. The 50 Ω series C2/L2 resonator then connects to input/output taps at 1/2, 1/3 or 1/4 of the turns above the ground connection. For the 160 meter BPF used in this example, L1 and L3 are quadrifilar wound with the 50 Ω taps connected to the top of the first quarter winding above ground. The L1 and L3 and C1 and C3 values then become 16 and 1/16 times the 50 Ω values, or 16.2 µH and 447 pF, respectively. By using a quadrifilar tap, the component spread is reduced to about 1.7, and the L1 and L3 reactance at the center frequency is *16 times greater* than before, or 190 Ω. This level of reactance is much more suitable for achieving a satisfactory inductor Q.

BASIC Program Calculates Many BPF Designs

Having decided on a winding style for L1 and L3, and finding trial values for C1 and C2, I then employ the BASIC program to evaluate many different designs (see Note 5). Although the program designs 160 meter BPFs, it is easily modified for other bands by changing the center-frequency variable (FC) from 1.87 to a new center frequency, and changing the C1 and C2 values to those appropriate for the new band.

To use the program, enter values for the variables TR, FC, C1 and C2. TR is the tap ratio, with the digits 3 and 4 indicating trifilar and quadrifilar windings, respectively. FC is the center frequency in megahertz (MHz), and C1 and C2 values are in picofarads (pF). The trial values of C1 and C2 were previously hand-calculated to be 447 pF and 263 pF, respectively, and some preliminary computer trials confirmed that the acceptable range of C1 is between 440 to 450 pF; consequently, this range is used for C1. C2's range was specified to be between 250 to 300 pF. When the program is run with these variables, the result lists six designs each for C1 = 440 and 450 pF, and for C2 ranging from 250 to 300 pF. If necessary, smaller capacitance increments can be used. For this demonstration, a step of 10 for C1 and C2 is adequate.

See Table 1 for the tabulation of 160-meter BPF parameters for TR = 4 with an L1 and L3 impedance of 800 Ω. Of all the possibilities, I considered only the design for C1 and C2 = 440 and 250 because I had capacitors on hand to realize those values. The 16.46 µH inductance value is obtained by using a quadrifilar winding on a Micrometals T130-6 core. Examination of the ripple cutoff frequencies of 1.75 and 1.99 MHz, the frequencies of 1.16 and 3.02 MHz at the 35-dB level and the return loss of 30 dB show that all are satisfactory. This design is acceptable, and its design, performance and construction parameters are listed in Table 2A for reference.

ELSIE *Confirms the Design*

The correctness of the design selected from the 160 meter BPF tabulation was further confirmed by evaluating it with a filter analysis program named *ELSIE*, available from Trinity Software.[7] *ELSIE*-calculated plots of return loss and insertion loss are presented in the Appendix (next month) along with the component values used in the computer simulation. The design selected from the BASIC program 160 meter tabulation is confirmed by noting that the *ELSIE*-calculated return loss of 30 dB and the 35 dB frequencies of the plots *are identical* with the computer-calculated values obtained with the BASIC program. In the *ELSIE* insertion-loss plot, the measured insertion loss above 2.2 MHz is greater than the *ELSIE*-calculated curve. I'll explain the reason for this later.

If the first attempts to obtain a satisfactory L1 and L3 value are unsuccessful, try other quadrifilar windings with four more or four fewer turns, and find the exact C1 capacitance needed to resonate the inductor at the center frequency. Then, use the program with C1's value fixed and let C2 vary over a limited range to find an acceptable design. No doubt many possible designs will be available, but only those with a 3 dB percentage bandwidth of less than 32% are narrow enough to be useful.

Toroidal-Core Selection

All inductors used in the BPFs are wound on powdered-iron or phenolic toroidal cores. Although this approach is more expensive than using simpler solenoidal-wound air-core coils, the toroidal type is preferred because of its self-shielding characteristic that allows the inductors to be physically close with little interaction, making for a more compact filter.

For power levels of less than 1 W, core sizes of 0.44 inches outer diameter or less are commonly used. At power levels of 150 to 200 W, however, the core size must be much larger to dissipate the heat resulting from core and winding losses without excessive temperature rise. Many years ago, it was a common misconception that core saturation was the primary limiting factor in high-power RF applications. However, Micrometals' core-loss measurements of their iron-powder cores at high frequencies show that, with sine-wave signals, *excessive temperature rise* resulting from the losses in the winding and core material is the limiting factor.[8,9] Micrometals specifies the maximum permissible core temperature at 100°C, but any long-term temperature above 90°C accelerates the deterioration of the core's binding material. Consequently, a temperature rise of less than 40°C is preferred so that in an ambient of 90°F (typical temperature for a hot day), the core temperature will be not more than 32 + 40°C = 72°C, or well below 90°C.

After each BPF design was complete, the filter was assembled and tested under a 200 W continuous load to confirm that the temperature rises of all inductors and capacitors is acceptable. Tim Duffy, K3LR, did most of the early power testing of the BPFs under load. John Brosnahan, WØUN, provided additional power testing later during the development of the BPFs. Both Tim and John provided network analyzer plots of insertion loss and return loss using Hewlett-Packard equipment usually not available to the average amateur experimenter. Their valuable assistance was crucial in confirming both the power capabilities and response performance of the BPFs, permitting the BPF development to progress with the assurance the designs were completely satisfactory. Several times different design variations were tried until Tim was satisfied that the BPF performance would be acceptable for the multi-multi applications.

For the 160 meter BPF, Micrometals T130-6 (yellow) cores are used for L1, L2 and L3. To minimize the temperature rise of L2, it is necessary to use two separate, series-connected inductors. For L1 and L3, a 10 turn quadrifilar winding (40 turns total) of #16 and #18 magnet wire delivered the design inductance of 16.46 µH with a measured Q of 195 at the center frequency. L2 is made of two T130-6 cores with 39 and 38 turns of #18 wire. Its Q measures 320. Details associated with the 160 meter BPF inductor assemblies are listed in the second column in Table 2A.

Inductors for the higher bands were designed similarly; their assembly details are listed in Tables 2A and 2B. For the 80, 40 and 20 meter BPFs, the L1, L3 and L2 cores are also T130s, but the material is -17 (blue/yellow) with a lower mu than the -6 material. L1 and L3 for the 15 and 10 meter BPFs are wound on T130 and T106 phenolic (tan) cores, while L2 remains two separate series-connected inductors, each wound on a T130-17 core.

Capacitor Selection

The voltage across C1 and C3 is 300 and 400 V RMS, respectively, for a 200 W input to a 50 Ω terminated BPF having a trifilar or quadrifilar-wound L1 and L3. Consequently, the RMS voltage rating of C1 and C3 should be greater than 400 V. Based on a 2 A current flowing through C2, the RMS voltage across C2 can range from a low of 574 V to as much as 1 kV. The C2 voltage depends on the product of two times the reactance of C2 at the center frequency. The C2 voltage rating should be greater than 680 and 580 V for the 160 and 80 meter BPFs, respectively, and even higher for the 40 through 10 meter BPFs because of their higher C2 reactances.

In addition to a safe voltage rating, the capacitors must be capable of handling the current associated with a 200 W RF signal passing through the BPF. For C2, the RMS current level is 2 A. Finally, so that filter construction is economically practical, the capacitors must be readily available and reasonably priced.

I selected Tusonix NP0 10% ceramic

capacitors,[10] having an outer diameter of about 16 mm. Although 5% tolerance units cost only a few cents more than the 10% tolerance capacitors, the 10% tolerance is specified so that the trimming operation associated only with the 5% tolerance can be omitted.[11] Harry Roseberry, W1HRZ, of the Tusonix Customer Engineering Dept, advised me that the nontrimmed 10% capacitors are better-suited for RF applications than the trimmed capacitors. Although this capacitor type is not formally rated by Tusonix for RF service, it is nevertheless widely used in nonstringent commercial and Amateur Radio RF applications. To minimize the chance of failure caused by greater-than-anticipated voltages or currents, and to derate the standard dc voltage rating by 50% for RF applications, capacitors with dc ratings of 2, 3 and 4 kV are used. To minimize the temperature rise caused by the 2 A current passing through C2, two or more capacitors in parallel are used at C2. The capacitors and their connection configurations used in each BPF are listed in Tables 2A and 2B.

The values of capacitance and voltage found to be most convenient are 110 pF/2 kV, 30 pF/3 kV and 15 pF/4 kV. Various series and parallel combinations of these three values make it possible to match all the design values. In some cases—because of tolerance variations in the powdered-iron cores used for L1 and L3—a few additional picofarads are needed across C1 and C3 to precisely tune both resonators to the center frequency. To achieve this, two small-value Ceramite 1000 VDC/300 VAC capacitors (type 10TCCQ) are wired in series and placed in parallel across the Tusonix capacitors. The Ceramite capacitors are available in small quantities from Newark Electronics.[12]

Tune In Next Month...

...when I'll tackle filter assembly and tuning, and put the wraps on this project.

Notes

[1]Assembled and tested band-pass filters are available from me. Send a business-size, self-addressed, stamped envelope for details to Ed Wetherhold, W3NQN, 1426 Catlyn Pl, Annapolis, MD 21401.

[2]Thomas Moliere, DL7AV, "Band Reject Filters for Multi/Multi Contest Operation," *CQ Contest*, Feb 1996, pp 14-22.

[3]Lew Gordon, K4VX, "Band-Pass Filters for HF Transceivers," *QST*, Sep 1988, pp 17-23.

[4]Alan Bloom, N1AL, "Inexpensive Interference Filters," *QST*, Jun 1994, pp 32-36.

[5]The program, in *BPFS.ZIP*, can be found on the Internet (ftp to **oak.oakland.edu/pub/hamradio/arrl/qst-binaries**) and on the ARRL BBS 860-594-0306. Space limitations prevented its publication here.

[6]*The 1998 ARRL Handbook for Radio Amateurs*, (Newington, ARRL, 75th ed), 1997, Table 16.2, pp 16.12 to 16.15.

[7]Trinity Software, 7801 Rice Dr, Rowlett, TX 75088, (Jim Tonne, President); tel 972-475-7132.

[8]Iron powder cores catalog *RF Applications*, Issue F, Sep 1996. Micrometals, 5615 E La Palma, Anaheim, CA 92807; tel 800-356-5977; **http://www.micrometals.com**.

[9]Zack Lau, W1VT, "Calculating the Power Limit of Circuits with Toroids," *QEX*, Mar 1995, pp 24-25.

[10]Tusonix, Inc, 7741 N Business Park Dr, Tucson, AZ 85743, tel 502-744-0400; **http://www.tusonix.com/tusonix**.

[11]Because the filter passband is generally much wider than required, it is not necessary to precisely tune a BPF to the exact center of the amateur band. (The center frequency to which all resonators are tuned can be about 0.6% above or below the design center frequency without the passband insertion loss rising within the amateur band.) However, resonators 1 and 3 must be tuned to within 0.2% of the *same* center frequency to assure that resonator 2 can be tuned for a proper return-loss response.

[12]Newark Electronics, 4801 N Ravenswood Ave, Chicago, IL 06040-4496; tel 800-463-9275, 312-784-5100, fax: 312-907-5217; **http://www.newark.com**, catalog 115, p 81.

Ed Wetherhold, W3NQN, received a degree in Radio Engineering from Tri-State University, Angola, Indiana, in 1956. From 1962 to 1992, he was employed at the Annapolis Signal Analysis Center of Alliant Techsystems, Inc (Alliant Techsystems was formerly the Defense Division of Honeywell, Inc), as a communications systems test engineer and as a certified TEMPEST Professional Level II.

Ed obtained his Amateur Radio license in 1947, while serving in the Air Force as a radio mechanic instructor at Scott AFB, in Illinois. For the past 15 years, he has been a technical advisor to the ARRL on passive LC filters.

Ed's many articles on simplified filter design have been published in the electronics trade and Amateur Radio journals, such as Interference Technology Engineers' Master *(ITEM),* QST, QEX, CQ *and* Practical Wireless, *and in professional EMC journals. The* 1998 ARRL Handbook *contains Ed's SVC filter design tables and an explanation of how to design passive LC filters.*

While not working on filters, Ed is active as a tournament tennis player and is ranked Number 1 in the Men's 70 singles and doubles in the USTA's Middle Atlantic section. You can contact Ed at 1426 Catlyn Pl, Annapolis, MD 21401, or by telephone at 410-268-0916.

New Books

RADIOSCIENCE OBSERVING—VOLUME 1

By Joseph J. Carr, K4IPV

Published by PROMPT Publications, a subsidiary of Howard W. Sams and Company, 2647 Waterfront Parkway East Dr, Indianapolis, IN 46214-2041, tel 800-428-7267. First edition, 336 pages, 7 3/8 × 9 1/4 inches, $29.95.

Reviewed by Steve Ford, WB8IMY
QST *Managing Editor*

Joseph Carr, K4IPV, is a prolific writer well known among readers of *CQ*, *Communications Quarterly*, *Popular Communications*, *Popular Electronics* and many other publications. *RadioScience Observing* is his latest effort and it is quite a remarkable book.

RadioScience Observing introduces you to a universe full of strange and fascinating radio signals—some natural, some man-made and others...well, who knows? The book does an outstanding job of describing the characteristics of these signals according to current theories. Most important, *RadioScience Observing* details the hardware and techniques that will allow you to eavesdrop on these "transmissions" yourself.

You'll encounter a number of RF oddities between the covers of *RadioScience Observing*. For example, you don't find too many hobbyist books that discuss such peculiar signals as "whistlers" and the "dawn chorus" at length. Ditto for the search for extra Terrestrial intelligence (with a chapter contributed by Dr H. Paul Shuch, N6TX, executive director of the SETI League) and natural emissions from the planet Jupiter.

RadioScience Observing includes a wealth of practical information on such topics as antenna design and using PCs to record and analyze signal information. The level of technical detail varies from chapter to chapter. The discussions of signal types and propagation can be easily understood by anyone. The sections on receiver characteristics (Chapter 3) can be a little intense, although Joe's straightforward narrative keeps you on the path. In fact, if you've ever had difficulty understanding the receiver specifications and ARRL Lab measurement data in *QST*'s "Product Review" columns, I highly recommend that you read Chapter 3 of *RadioScience Observing*!

RadioScience Observing comes with an attractive bonus: a CD-ROM nestled inside the back cover. This clever software package actually lets you hear some of the unusual signals discussed in the book. I'd never heard a whistler until I booted up the *RadioScience* CD-ROM (they sound like cheesy audio effects from a bad '50s science-fiction film). There are also antenna design specifications for everything from wideband dipoles to parabolic dishes. A handy calculator lets you determine the effects of noise and gain in a hypothetical receiving system of your choice. Images abound—gorgeous shots of nebulae, planets, and our own sun. Finally, the CD-ROM features *music*. No kidding. It is original music by Bonita Carr based on signals from pulsars and whistlers. While they seemed out of place at first, I found the compositions haunting—a compelling blend of the "music" of humankind and nature.

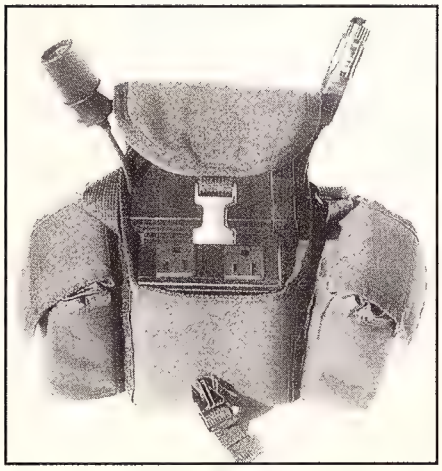
RadioScience Observing isn't the kind of book that you'll sit down and read from cover to cover. It is a reference work that you'll refer to as you explore the various aspects of signal reception and analysis—the "science" in *RadioScience*.

PORTABLE AC/DC POWER SOURCE FROM CUTTING EDGE

◊ Designed to power ac and dc tools, lights, radios and electronics where conventional power is unavailable, Cutting Edge's PowerPort 259 combines a 12-V, 9-Ah power cell with a compact inverter. The unit puts out 250 W of 117 V ac power (500 W peak) to two standard outlets, and up to 20 A of 12 V dc.

Weighing only 9 pounds, the '259 measures only 4.25 × 4.5 × 6 inches. It can be charged from your vehicle's electrical system or from its included automatic wall charger.

Prices: $179.95 (250 W, 9 A); $159.95 (140 W, 9 A); $119.95 (50 W, 7 A). For more information, contact Cutting Edge, 1803 Mission St, Suite 546, Santa Cruz, CA 95060; tel 408-429-5384, fax 408-426-0115, e-mail **cutedgent@aol.com**.



HEAVY-DUTY MAGNETIC ANTENNA MOUNT FROM LAKEVIEW

◊ Lakeview, known for its popular line of "Hamstick" mobile antennas, has released the Model 375 Tri-Magnetic Mount for HF mobile antennas. Featuring three powder-coated magnets that total more than 400 pounds of holding power (thanks to a 12×14-inch footprint), the '375 comes with standard 3/8-inch by 24 threads and 15 feet of RG-58 coaxial cable (PL-259 plug included). Aluminum and stainless steel hardware eliminate rust problems. Anti-scuff pads protect your vehicle's finish.

Price: standard model, $39.95; NMO/SO-239 model, $44.95. Shipping and handling is $7 each. For more information, contact the Lakeview Company, 3620-9A Whitehall Rd, Anderson, SC 29624; tel 864-226-6990; fax 864-225-4565; **http://www.hamstick.com**, e-mail **hamstick@hamstick.com**.

COMMON-MODE FILTERS FROM RF INQUIRY

◊ Japanese manufacturer RF Inquiry is making its coaxial common-mode filters available in the US. The CF250E (250 W rating) and CF5KV (5 kW rating) are designed to reduce or eliminate common-mode RFI in coax-fed HF antenna systems from 1.8 to 54 MHz.

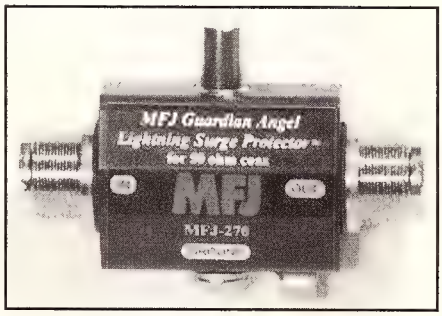
Prices: $99 (CF250E); $139 (CF5KV). For more information, contact OB Communications, 1112 Bourne Ln, Suite 101, Schaumburg, IL 60193; tel 888-301-8198; fax 847-301-6266.

MFJ's "GUARDIAN ANGEL" COAXIAL SURGE PROTECTOR

◊ Designed to protect expensive radio gear against destructive lightning surges and static discharges on systems fed with 50-Ω coaxial cable, the MFJ-270 lightning surge protector uses a fast gas-discharge tube (replaceable) to safely shunt up to 5000 A of peak impulse current to an independent ground connection.

The '270 presents a steady 50-Ω impedance to your transmission line, has standard SO-239 coaxial connectors and works with all coax-fed antennas.

Price: $29.95. For more information, see your local Amateur Radio products dealer or contact MFJ, 300 Industrial Park Rd, Starkville, MS 39759; tel 800-647-1800; fax 601-323-6551; **http://www.mfjenterprises.com**.



MOBILE SCANNERS FROM RELM

◊ Designed for high-performance mobile work, Relm Communications' MS 180 and MS 200 multiband mobile scanners feature coverage of the 800-MHz public-safety bands, a scan rate of up to 100 channels per second, birdie lockout, weather search, backlit LCDs and direct channel access.

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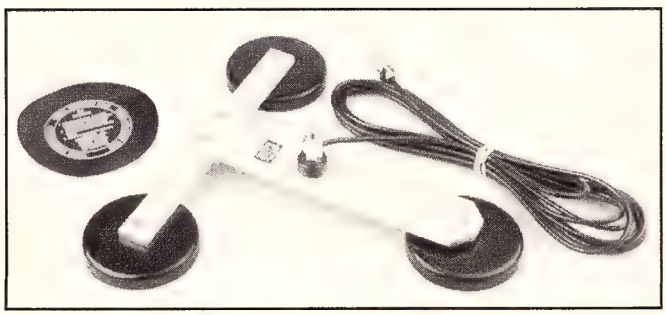
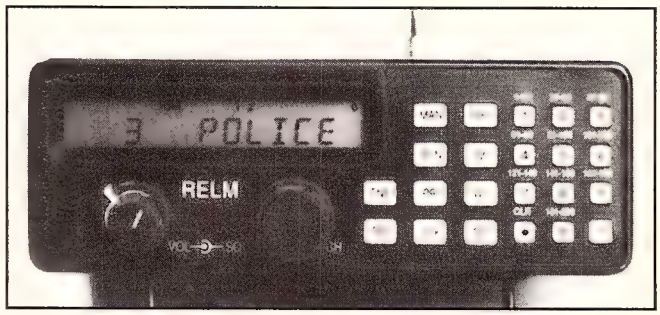
For pricing and other information, contact RELM Communications, 7505 Technology Dr, West Melbourne, FL 32904; tel 407-984-1414. QST





By Steve Ford, WB8IMY

A Conversation with... Steve Waterman, K4CJX

The latest in a series of interviews with hams who are making important contributions to our hobby.

Steve Waterman, K4CJX, is one of a number of hams throughout the world who provide valuable services by blending computers, the Internet and Amateur Radio. The HF digital gateway station Steve maintains at his home in Nashville, Tennessee, allows hams at sea or other remote locations to exchange Internet e-mail with nonham friends and families.

Steve Waterman, K4CJX, at the helm of his gateway station.

What motivated you to provide this e-mail gateway service to the mobile and remote ham community?

I had become interested in HF ham-to-ham BBS traffic on the old *ApLink* network (now termed *WinLink*). After operating a BBS for more than seven years, I noticed (like everyone else) that Internet e-mail traffic was becoming inversely proportional to ham digital traffic. In other words, ham digital traffic was decreasing rapidly! At the same time, I noticed that some RV (recreational vehicle) enthusiasts were trying to use the network to relay messages to their families—with mixed results.

I thought about the original intent of the author of the *ApLink* system, Vic Poor, W5SMM, who designed the software to communicate digitally from his boat to *his* family and friends. I realized that linking ham radio to the Internet e-mail system would not only boost my BBS traffic, but also the visibility of ham radio to the public.

The idea of a ham/Internet gateway on HF really didn't seem all that unusual. I considered it a natural step in the evolution of amateur digital communications. After all, why shouldn't hams take advantage of new enabling technologies? Adding a gateway to my system would be an ideal opportunity to perform an important public service. A ham/Internet gateway would also attract the attentions of the nonham RV and seagoing community. What better way to motivate these people to get their tickets?

My problem was finding someone to write the code. After a long search, Jim Jennings, W5EUT, a former *WinLink* SysOp, agreed to do the coding. Like Vic Poor, who originated *WinLink* to communicate from his boat to the VHF packet network, Jim needed it for his own RV roaming! Being retired and "driven," it took him no time to get the initial version completed. Jim continues to enhance it.

What is the *WinLink* Network?

The *WinLink* Network has been around for about 8 to 10 years. It is a worldwide amateur HF digital network linked to the VHF/UHF packet and satellite packet gateways. There are more than 100 *WinLink* stations at the present time. They mainly utilize PACTOR I and II, but some will also accept CLOVER connections. There are a handful of stations like mine that have dedicated themselves to the *NetLink* (interfacing to the Internet e-mail system) system. Information about these *NetLink* stations, along with other *WinLink*-only stations, can be found on my Web site at **http://home.earthlink.net/~WinLink/**.

Tell me about your particular operation.

As you can imagine, the gateway must be kept on the air 24 hours a day, 7 days a week, all year long to really be effective. In a typical 24-hour period, my gateway has more than 80 users with a total time of over 900 minutes and utilization of greater than 50%. Last month, over 6800 messages passed through the system.

The station consists of a modern transceiver and amplifier, which are "computer enabled," a TNC that supports both PACTOR I and PACTOR II, a Pentium computer and an all-band omnidirectional antenna.

The software controls everything. A *WinLink* scanning module controls the transceiver, scanning 17 frequencies on the 80, 40, 30 and 20 meter bands, spending approximately 2 seconds on each frequency, completing a cycle in about 35 seconds. (The actual frequencies are on my Web site.) When a station calls on one of these frequencies, the system stops, conducts the traffic transfer, pauses a few seconds, and then continues. With the combination of *WinLink* software modules, the frequency,

mode, power, antenna and even call polling is predefined and then implemented.

Because of the broad coverage, including the specific VHF/UHF packet frequencies, just about anyone, anywhere, with a digital setup can log into the system to send and receive messages to other hams, or to anyone else through Internet e-mail. The *WinLink* BBS software contains many modules that keep the messages flowing and provides extensive performance and traffic statistics about who is using the system. There is also software, which I wrote in a simple script language, that provides an alarm system for faults that are generated from the amplifier and resets it should something go wrong.

NetLink, which is the interface control between *WinLink* and the Internet, automatically dials my Internet Service Provider, reads the pending e-mail on the ISP server, and then transfers only the messages relevant to the process. It then downloads a user-definable number of NOAA text-based weather products, placing them in bulletins, and then hangs up. While all this is happening, *NetLink* provides statistical information about the transfer process.

I provide my users with access to Internet e-mail, links to other HF *WinLink* relay stations, entry into the regional VHF packet network, NOAA text-based marine weather products and medical emergency information (provided on request from several retired doctors!).

Let's say that I'm vacationing in my RV and I want to link to your gateway to send some e-mail to my family. What sort of equipment do I need?

Not much! A reasonably modern, stable SSB transceiver, a multimode controller with PACTOR, and a computer such as a laptop. This sort of station is small enough to squeeze into just about any RV, boat or whatever. Hams have taken similar setups into deep jungles, the arctic, you name it. You select a frequency according to the propagation conditions at the moment and attempt to connect to K4CJX. If my system isn't already in use, it will process your signal, establish a link and take it from there.

And if I can't connect?

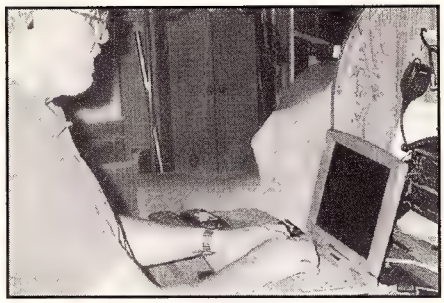
Put the scan frequencies in your rig's memory and find the signal. Then it's just a matter of waiting for your turn.

How does my family send mail to me via your system?

All they have to do is get on the Web and check into my site at **http://home.earthlink.net/~WinLink**. All the details are there.

The short answer is that they must send their e-mail to an Internet address specifically set up for this purpose by whichever NetLink station you decide to use–mine or someone else's. Once you have this address, you can pass it along to your friends and family.

Bob Jones, WB6LNH, captain of the *Pelago*, connects to the K4CJX gateway to pick up mail from the Internet.



Have PACTOR controller and transceiver—will travel! Bob Bingham, K9WMP (above), logs into the K4CJX gateway to check for e-mail after setting up his camper trailer (below) for the night. He was travelling in the Yucatan at the time!

Operating this station sounds like a full-time job. Is it?

Yes! Even though the processes are totally automated, the people using the system are not. The users require assistance. I spend a minimum of two hours each day maintaining the operation.

In addition to operating the station, *WinLink* SysOps are responsible for developing ideas and providing specifications for new features (or testing new code). This also takes quite a bite out of my evenings. The satisfaction of knowing that we are providing communications for hams and their friends and families is our reward.

Where can I obtain more information about *WinLink* and *NetLink*?

There are several Web sites with information regarding all this. I'd suggest **http://www.win-net.org, http://home.earthlink.net/~winlink, http://www.cde.com/~n0zo/, http://www.startel.net/w5eut/, http://home.sprynet.com/sprynet/w4npx/, http://www.dwatt.com**

What do you think the future holds for Amateur Radio?

I'd like to echo the comments of AF9Y in the January 1998 *QST* ("A Conversation with ... Mike Cook, AF9Y," page 56.) We'd better stop arguing about which mode is best and what constitutes ham radio. There are no more lines to draw in the sand. We must adapt to our current world environment by utilizing new technologies to our advantage if we are to survive as a hobby. Some of us spend way too much time hashing out these issues on the air and on the Internet. Resistance to change is futile. As someone once said, "Rocks are hard, water is wet, and things change."

Steve reports a surge of interest in Amateur Radio among sailing enthusiasts—especially after they hear about HF e-mail gateways. Vic Poor, W5SMM, explains the technology (and Amateur Radio) to a receptive audience at the Seven Seas Cruising Association in Melbourne, Florida, last November. QST

Q Ron Davis, W4SSL, asks, "I recently acquired a dual-band H-T that I would like to use on 2 meters with my MFJ-1796 vertical antenna. As you may know, this antenna covers several HF bands along with 6 and 2 meters. I'm feeding the antenna with 40 feet of RG-58 coax. My friend says that I'd have to replace this feed line if I wanted to use my H-T because the loss at 2 meters is too great. Is this true? If so, is there a common, affordable replacement that would solve the problem?"

A Your friend is correct concerning the loss in your 40 feet of RG-58 at 2 meters. And remember that the loss works both ways—it reduces your transmitted signal and attenuates received signals.

Assuming that your antenna presents a 1:1 SWR on 2 meters, you can expect to see a loss of 2.6 dB (about 45%) at 146 MHz with 40 feet of "typical" RG-58 coax. In other words, nearly half of your transmit power will be lost, along with a comparable reduction in received signals.

But even replacing the RG-58 with commonly available *foam* RG-8 coax will provide a substantial improvement. Now your matched loss at 146 MHz would drop to a much more acceptable 0.8 dB, or about 17%. Of course, losses will be reduced on the lower bands as well.

Q Jerry Hess, W9KTP, asks, "I've often wondered if hams can receive the transmissions directly from the Hubble Space Telescope. What frequency does it operate at?"

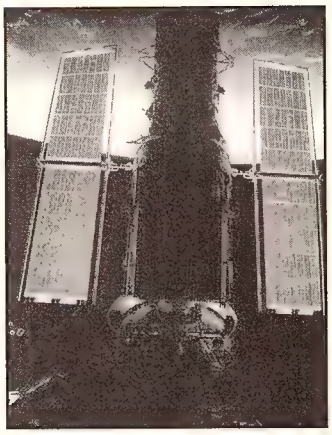
A The Hubble Space Telescope does not transmit to the ground directly. Instead, it communicates (and observes) through a system of schedules and relays.

The observing schedule is put together at the Space Telescope and Science Institute at John Hopkins University in Baltimore and forwarded to the Goddard Space Flight Center (GSFC) in Greenbelt, Maryland. The telescope is actually controlled from the Space Telescope Operations Control Center (STOCC), located at GSFC. Communication with the spacecraft is via the Tracking and Data Relay Satellite System (TDRSS), which consists of a set of satellites in geosynchronous orbit.

Commands for Hubble originate at the STOCC and are sent by land-line or communications satellites to the TDRSS ground station at White Sands. From there the commands are sent via the appropriate TDRSS satellite to Hubble. Scientific data are sent from Hubble to the STOCC via the reverse path, and then from the STOCC back to the Science Institute by dedicated high-speed links.

The TDRSS satellite network supports many spacecraft in addition to Hubble. Therefore, use of the network, either to send commands or return data, must be scheduled. Because of limited TDRSS availability, command sequences for Hubble observations are uplinked periodically and stored in the telescope's onboard computers. Hubble then executes the observations automatically.

I suppose it would be possible to monitor the TDRSS relays, but with the satellites supporting so many services, it would be extremely difficult to tell which data stream was from Hubble, much less decode it.


The Hubble Space Telescope

Q Jeff Hayden, N5UJJ, asks, "What are the channels and frequencies for the Family Radio Service?"

A Fourteen channels comprise the Family Radio Service:

Channel	*Frequency (MHz)*	*Channel*	*Frequency (MHz)*
1	462.5625	8	467.5625
2	462.5875	9	467.5875
3	462.6125	10	467.6125
4	462.6375	11	467.6375
5	462.6625	12	467.6625
6	462.6875	13	467.6875
7	462.7125	14	467.7125

Q I heard someone on the air talking about new flat-screen computer monitors that are much smaller and lighter than traditional CRT designs. Are these really available?

A Yes, they are—but you'd better have a healthy bank account if you intend to buy one! The new flat-screen monitors were big hits at the most recent Consumer Electronic Show and already they are starting to show up in some retail catalogs. These monitors use the same LCD (liquid crystal display) technology that you've probably seen in laptop displays. The flat screens are only about two inches thick, which make them attractive to hams who are already squeezed for space on their operating desks. (There is no word yet on how well they stand up to RF, though.) The displays are ultra-crisp, so much so that it is almost painful to return to a cathode-ray tube monitor after using one of these for a while! The only operational disadvantage that the Doctor knows of thus far is the usual "viewing angle" effect that you get with many LCD displays. Unless you're looking at the dead center of a flat-screen display, the image quality tends to suffer somewhat.

So how much does one of these marvelous displays cost? A 14-inch NEC model (the LCD400V) retails at nearly $2000. As with all PC components, however, you can expect the prices to fall considerably over the next few years.

Q I live in the United Kingdom and I am using a Cushcraft R7000 vertical as one of my HF antennas. Something has gone awry because my SWR has suddenly jumped to unacceptable levels on all bands. I'd rather avoid a long overseas telephone call to the company at this point. Can you offer some suggestions?

A I'd suggest a letter or e-mail to Cushcraft. They have a "problem survey" form that may help you evaluate your specific antenna setup. Based on the information you provide, they can respond with possible causes. Contact:

Cushcraft Corp
48 Perimeter Rd
Manchester, NH 03103
e-mail **hamsales@cushcraft.com**

There is one potential trouble spot you can check before you request the form. Start by disconnecting the coax at the base of the

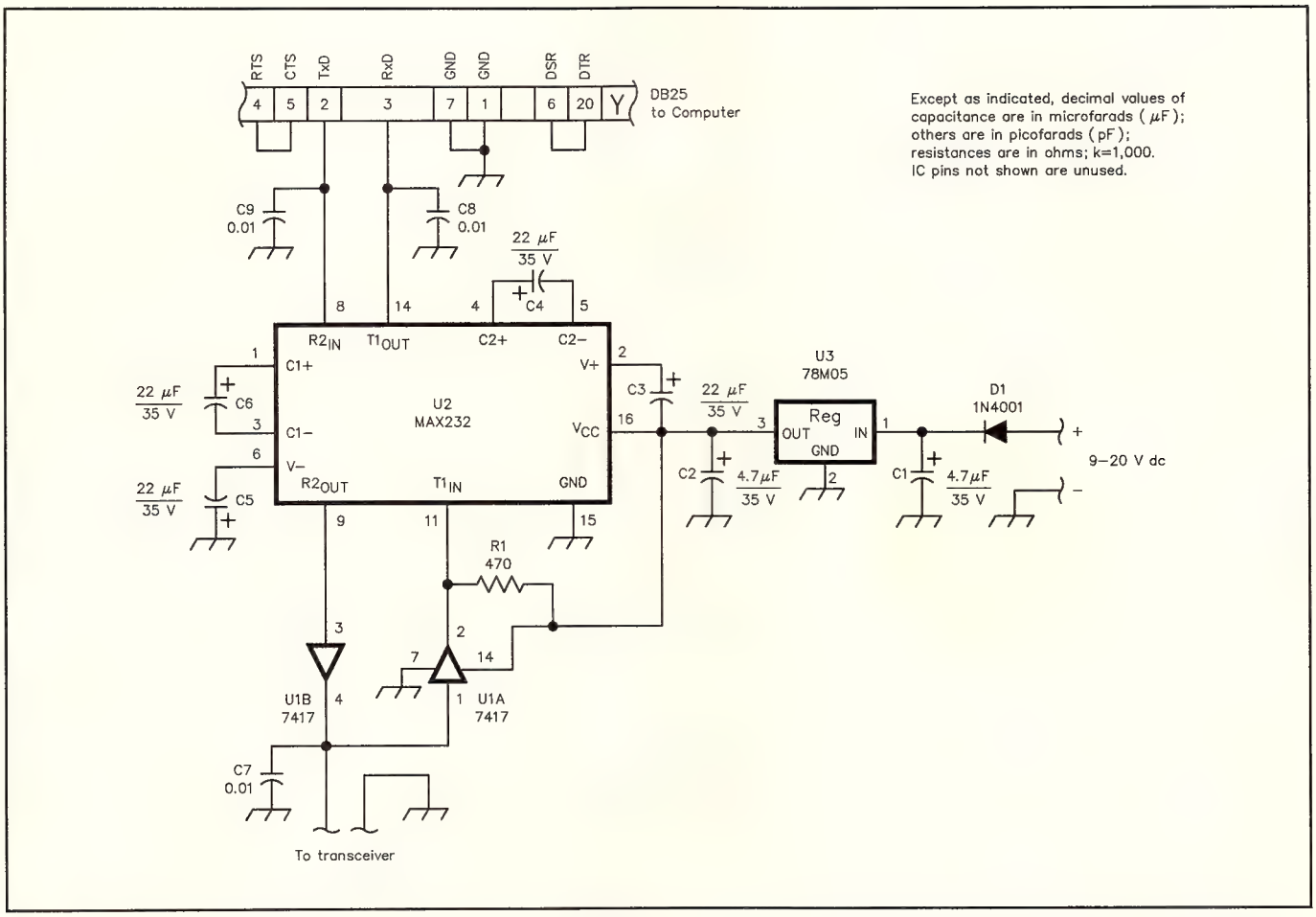


Figure 1—A computer interface for PC control of ICOM and Ten-Tec transceivers. Radio Shack part numbers shown unless otherwise noted.

C1, C2—4.7 μF, 35-V electrolytic capacitors (272-1024)
C3-C6—22 μF, 35-V electrolytic capacitors (272-1026)
C7-C9—0.01 μF ceramic disc capacitors (272-131)
D1—1N4001 diode (276-1101)
R1—470-Ω resistor (271-1317)
U1—7417 hex buffer/driver (JDR Microdevices, tel 800-538-5000; part no. 7417)
U2—Maxim MAX232 (JDR Microdevices, tel 800-538-5000; part no. MAX232CPE)
U3—7805 voltage regulator (276-1770)

antenna and attaching a dummy load. If the SWR drops to 1:1 (or something close to it), your feed line isn't the culprit. On the other hand, if the SWR remains high, you have a problem in the coax or the connectors.

In addition, inspect the antenna carefully, including the matching network at the base. Look for signs of burning or moisture intrusion. Keep an eye open for damage caused by insect or animal pests, too! This is a much less common problem, but it *does* happen.

Q Before I invest in a 56K modem for my shack PC, I want to know how long it will be before something else makes it obsolete. Can you give me your best guess?

A Hmmm ... the Doc's crystal ball is a bit foggy on this one. Cable TV modems are just beginning to penetrate the market and they offer *megabit*-per-second Internet access. Progress is slow, however. Only 10% of the current home market is wired for Internet cable, and there are only about 100,000 subscribers. If you live in one of these areas, consider yourself lucky. If you don't, your local telephone company can usually provide ISDN lines that will accommodate 128 kbps, but the costs can be pretty stiff. The telephone companies are also working on DSLs—Digital Subscriber Lines. They promise to pump data at a stunning 8 megabits per second, but the hardware isn't in place. A less complex version of DSL, known as Asynchronous Digital Subscriber Lines, or ADSL, is capable of exchanging data at *only* 1.5 megabits per second. There are political and economic hurdles standing in the way of DSL and ASDL, however, so I wouldn't look for either to be available for several years. So, unless you can afford ISDN, or are fortunate enough to live in an area wired for Internet cable, your 56K modem should provide useable service for a while.

Q I own an ICOM IC-706 transceiver that I would like to control with my computer, but the interfaces are rather pricey. Is there a more affordable alternative?

A Certainly—make the interface yourself. We're talking about two ICs, a voltage regulator and a handful of components. The interface shown in Figure 1 will work with most newer ICOM and Ten-Tec transceivers. U1 is an RS-232-D transceiver chip that translates between the TTL levels your rig uses and the RS-232-D your computer understands. The interface connects to the radio via a 1/8-inch phone plug. The sleeve is ground and the tip is the data bus. The illustration shows a DB-25 connector for the PC, but you can also reconfigure for a DB-9 connector. You'll find the DB-9 connector information in Chapter 22 of the *ARRL Handbook*.

Do you have a question or a problem? Ask the doctor! Send your questions (no telephone calls, please) to: "The Doctor," ARRL, 225 Main St, Newington, CT 06111. QST

By Dr Fred Drake, KIØET

Contesting—A Family Affair

If you think radio contesting is best reserved for experienced ops with megadollar stations—think again. As this proud ham father discovered, all you really need is a couple of competitive youngsters and simple equipment. With this kind of family fun, everyone's a winner!

Can a family of new hams have fun contesting? You bet. While some may need to post a score in the hundreds of thousands to feel satisfied, new hams can have a great time and improve their operating skills by setting their own goals for any contest.

I was first licensed in January 1996. My 14-year-old son Aaron, KBØVKZ, followed one month later. And my 10-year-old daughter Rachel, KCØBMY, joined the team in June 1997.

We've had a great time exploring various ham radio activities, and I'm always on the lookout for things we can do together. We enjoyed working events such as Field Day, volunteering for the MS 150 bike ride, and Operation Santa, where local hams visit people in the hospital on Christmas Eve. As Technicians, my son and daughter especially enjoyed working HF on Field Day under the supervision of a control operator.

Contesting seemed like a good way to increase the kids' HF operating time and hopefully motivate them to upgrade. But because my modest station doesn't make many DX contacts, the phone portion of the ARRL November Sweepstakes, with its focus on North American contacts, seemed like an ideal first contest.

I started planning at the end of September when I saw the rules posted in the October 1997 issue of *QST*. "An Average Op's Guide to Contest Fun," by Kirk Kleinschmidt, NTØZ, in the same issue, also encouraged me to give it a try.

I decided that if we worked the contest in the multioperator category, Aaron and Rachel could again have the thrill of working stations all over the US with me serving as control operator. When asked, both thought the contest was a great idea.

I read several articles about contesting, and one thing they all emphasized was that good computer software really helped simplify contest record keeping. Because this was our first try, I wanted to keep expenses to a minimum. That meant shareware. Over the next week I downloaded several contest logging programs from the Internet. None was perfect for our purposes. Some were too difficult to use. Some supported only foreign contests. Some could not be used in an actual contest unless they were purchased.

I finally settled on *SS*, version 2.5, by Les Delmarter, WB6YIK. Although it was not updated for the current year and I couldn't add the newest sections, it seemed to be the best for our purposes. I decided I could edit the log at a later date if we worked hams in any of the new sections.

First Things First

The week before the contest I had a couple of training sessions for my co-operators. They practiced tuning the rig (a Ten-Tec Omni D hooked to a dipole antenna), making simulated contacts and completing the Sweepstakes exchange. I worked on understanding the software so the logging would go smoothly.

We set goals for ourselves, the first of which was to have an enjoyable experience as father, son and daughter. The second goal was not to disrupt the routine for my wife and older daughter who are not hams. Our goal for the contest itself was to make a modest 100 contacts. That would qualify us for a collectible lapel pin.

On contest day, November 15, we gathered around the rig as 2100 UTC approached. We felt ready. Rachel was on the microphone, Aaron was ready to log and I was sitting behind them to coach.

SARAH DRAKE

From left to right, Aaron, Rachel and Fred Drake take a break during the 1997 ARRL Phone Sweepstakes.

We started on 15 meters with the idea of saving the lower bands for the hours of darkness. As the contest started, the speaker filled with the noise of what seemed like hundreds of stations.

We got off to a slow start, with our first contact coming some eight minutes later thanks to K7IR in Western Washington. He got us out of the starting blocks and already had 14 contacts by the time he worked us!

That pattern continued, and we took 3 to 12 minutes between contacts. Rachel proved to be a tenacious operator with a keen sense of competition. She fearlessly dove into pileups. We finished the evening with 27 contacts in seven hours of off-and-on operating.

Saturday, Aaron was gone to a band workshop and the whole family went to his concert that night. Sunday, we went to church, morning and evening, working in several hours of contesting on Sunday afternoon. By the time Sunday night rolled around and the contest shut down at 0300 UTC, we had 93 QSOs and 46 sections. Our claimed score is 8556 in the multioperator category.

Can this modest performance in any way be judged a success? After all, some hams logged more QSOs in an hour than we did for the whole contest. From our viewpoint the answer is a resounding *yes*. Everyone had a great time. Aaron and Rachel were thrilled to work on the HF bands and I was happy that we had experienced new opportunities in ham radio. We didn't make our goal of 100 QSOs, but there is always next year. Right now, my bet is that we'll be back.

Contesting can be a family affair, especially if you remember to put the family first and the contest second!

Dr. Fred Drake (Ed.D.) has been a middle school science teacher in Springfield, Missouri, for 18 years. He was first licensed in January 1996 after participating in a father/son Technician licensing class. He serves as secretary of the Southwest Missouri Amateur Radio Club and directs the club's Novice/Technician classes.

2051 E. Cardinal St
Springfield, MO 65804
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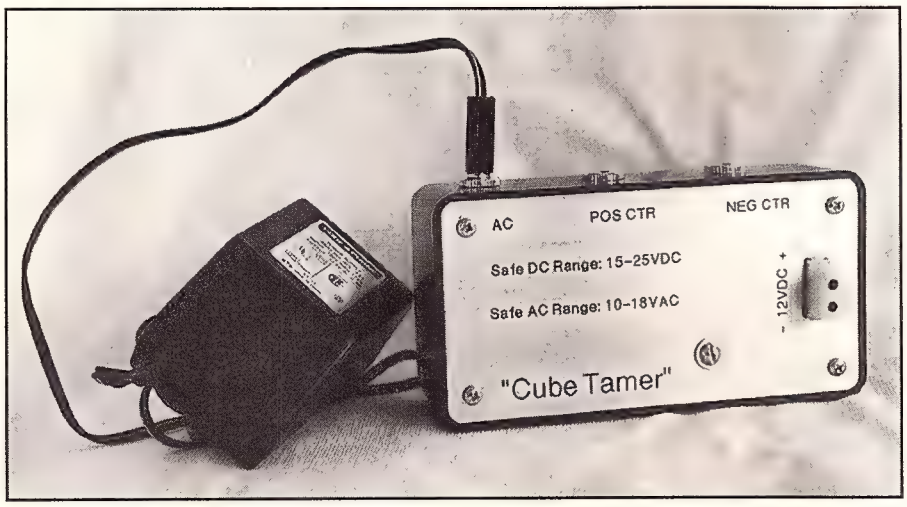
By Mike Aiello, N2HTT

The Cube Tamer



Here's an inexpensive, one-evening project that will turn just about any wall cube power adapter into a filtered, regulated power supply.

Part of the appeal low-power (QRP) hamming holds for me is that it's easy to take your radio along on outings, family vacations, and in your car. But the type of remote operation that most fascinates me is "hotel portable"—operating HF QRP during off times on domestic business trips. What a great way to enjoy the hours that would otherwise be spent watching TV!

To operate portable QRP you need a few *necessary* items:

- A QRP transceiver. Just look at all the kits and assembled models there are available these days!
- An antenna tuner (not always necessary, but a big help when you're operating from difficult locations).
- A key and headphones.
- An antenna. I haven't found the ideal solution yet, but with a good tuner you can make any decent length of wire radiate!
- A power supply.

When I'm traveling for leisure, finding a power source isn't a problem. Usually I use a 12-V gel-cell battery, which will comfortably power my little kit-built rig for about 48 hours. A gel-cell, however, is not the kind of thing you'd want to haul around in your carry-on luggage. In fact, I'm leery of trying to go through an airport security check with a bundle of C cells, lots of wire, and some strange looking electronic devices in my carry-on bags! You could miss your plane explaining that stuff, even with a copy of your FCC license in your wallet.

With a couple of short domestic business trips coming up, I was giving a lot of thought to the hotel-portable scenario, and the item that was really stumping me was power. You can buy off-the-shelf 1-A dc supplies that would do the trick, but none I've seen is in the same miniature scale as the rest of my station. And nothing takes the fun out of this sort of adventure faster than adding a lot of "lug" to your luggage, especially if you have to change planes in Chicago.

While rummaging around my home office one evening, I happened to open a drawer that contained a few of the 75 or so wall cube transformers I own. These cubes are what remain after a consumer electronic device dies. (This is somewhat akin to the coral reefs, which are composed of the skeletal remains of tiny polyps—I think future archeologists will puzzle over the great mounds of wall cube transformers left behind by our late 20th century civilization.) A quick shuffle through the pile turned up a 12-V, 500 mA cube whose cord had been cut short (cannibalized, no doubt, for the coaxial power plug it originally possessed). Wow! Could I use this thing to power my rig?

A quick check of the specs that came with my QRP transceiver revealed that at full output (about 2.5 W at 14.0 MHz), the rig would draw not more than 450 mA at any voltage from 10 to 16 V dc. The current drain while listening was considerably less, 35 mA or so. Checking the cube with my digital voltmeter I found a brisk 13.8 V dc—excellent! But how clean and well regulated was that voltage? With the voltmeter set to measure ac I discovered 55 mV of "ripple"—not bad, less than 0.5%. Unfortunately, when I connected the cube to my rig and keyed it into a dummy load, the ac ripple shot up to 264 mV, or about 3%. Also, there was little or no regulation on the dc voltage. When I keyed my transceiver, the cube's output dropped to 11.5 V. This was marginal performance, at best.

Back to the *Handbook*

It was tantalizing to think that the wall cube I held in my hand was almost the solution to my power problem. I began to think about what was missing. Basically, the cube's output needed more filtering to remove the ac ripple, and some regulation to keep the supply voltage from dropping when it was under load. Could I add some components in a separate box to "tame" the cube's output?

Thinking back to a power supply I had built from a transformer and bridge rectifier (circa 1975), I remembered the electrolytic capacitor (the size of a beer can) placed across the rectifier's out-

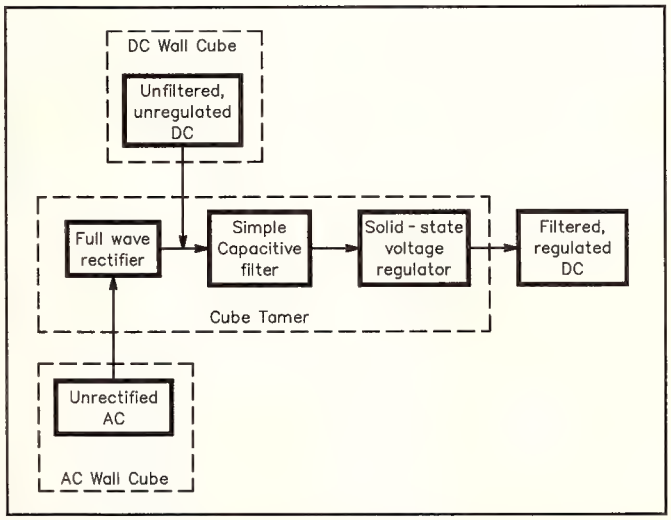


Figure 1—Block diagram of the Cube Tamer.

put. It filtered and smoothed the dc output. Maybe a big capacitor would solve my problem now. I also recalled that you can buy a wide variety of solid-state voltage regulator chips for very little money at good old Radio Shack. Perhaps one of these chips, and a few components to form a filter, could be placed between the cube and my rig.

It occurred to me that if I had to have a big cap, why not add the rectifier bridge, and be able to use cubes that only produce ac? And for that matter, if I added another input connector, wired opposite to the first, this little box could handle coaxial power connectors that were either center-positive or center-negative. The result would be a general purpose wall cube "cleaner-upper" that would work with whatever cube you had handy (within certain voltage and current limits, anyway). Thus, the "Cube Tamer" was born. Figure 1 shows a block diagram of the Cube Tamer interface. The schematic and parts list is shown in Figure 2.

The next question was how much filtering would I need for a box that would output 12-V dc, and a maximum current of about 1 A. The *ARRL Handbook* came to the rescue. After reviewing the section on power supply design, I found formulas for computing the size of the filter capacitors. I also learned that I should include a bleeder resistor in my filter. This resistor "bleeds" the charge from the filter capacitors when the power supply is turned off—an important safety feature since filter caps can store a *lot* of charge!

The Final Design

A quick trip the following day to Radio Shack (I love to practice "design by browsing") allowed me to finalize the Cube Tamer circuit based on the components I could buy off the shelf. The input connector I chose is a coaxial power plug receptacle, since most wall cubes use the matching plug. There is one for ac, one for dc with the center post positive, and one for dc with the center post negative. It turns out that there are two versions of this coaxial connector that are commonly used: one whose inside diameter is 2.1mm and another with a 2.5 mm inside diameter. The receptacles I used have a center post with a diameter of 2.5 mm, so a cube with a 2.1 mm plug cannot be plugged in. There are three design choices:

1. If you already have selected a wall cube to use, pick the receptacle that matches its plug.
2. Standardize on one receptacle and change the plug on your wall cube if necessary (this is what I did).
3. Make a converter pigtail. Radio Shack sells an in-line receptacle for the 2.1 mm ID plugs (RS 274-1577), which with a short length of two-conductor wire and a 2.5 mm ID plug (RS 274-1576), forms a converter for cubes with the smaller termination.

The rectifier is the smallest full-wave diode bridge that Radio Shack sells. With its 4-A current rating, it can comfortably handle the expected load. The dc output of the bridge, along with the input from both dc input connectors, goes to the capacitive filter.

The *ARRL Handbook* provided a formula for computing the capacitance necessary to achieve a specified percentage of ac ripple, given the desired dc voltage and current. One example in the *Handbook* was for 12 V at 1 A with 2% ripple or less. The calculated filter capacitance was about 11,500 µF. Radio Shack does not stock capacitors that large, but they do sell a 4700 µF electrolytic with a working voltage of 35 V dc. Three of these caps in parallel, totaling 14,100 µF, provide more than enough filter capacitance. The *Handbook* also suggests the use of a bleeder resistor. I chose a 1300 Ω, 1-W resistor for the job. Under worst-case conditions this resistor will dissipate about 0.6 W.

The regulator I used, a 7812 12-V regulator, has a maximum input voltage rating of 35 V dc, and a current dissipation of 1 A. I bypassed the output side with a 0.1 µF capacitor—bypassing the regulator provides a low-impedance path to ground that helps minimize any stray RF that might be getting into the output voltage.

I chose a female two-conductor Molex connector for the regulated output voltage. Although these are a little annoying to work with (you have to cut a rectangular hole to mount them) several years ago I switched all my low power equipment over to use these polarized plugs, so for me Molex connectors are plug-and-play. If you build one of these, you should go with your favorite power connector, or perhaps just a pair of binding posts for the output.

Finally, I selected a small project box with a metal cover. Mounting the voltage regulator directly to the metal would allow the cover to function as a heat sink. The regulator package is designed to make this easy by providing a heat sink fin and a hole through the package that will allow a 6-32 screw to pass.

I used the "ugly" construction technique to build the Cube Tamer. That is, I just soldered the component leads together, minimizing lead lengths whenever possible. I soldered the capacitors directly to the legs of the regulator and the bridge. The bridge is mounted to the metal box lid with hot glue; the regulator is held snug with a bolt through its heat sink. This approach places the metal lid of the box at ground potential with respect to the regulated 12 V. Final construction consisted of wiring the input and output power connectors and assembling the box. The entire project took about an hour, and a lot of that time was spent cutting that darn rectangular hole.

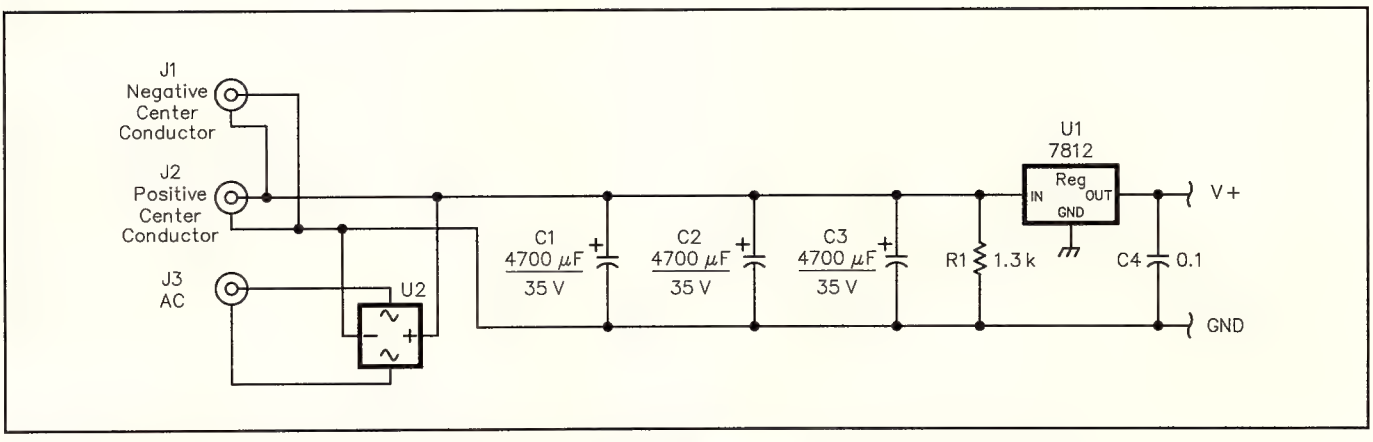
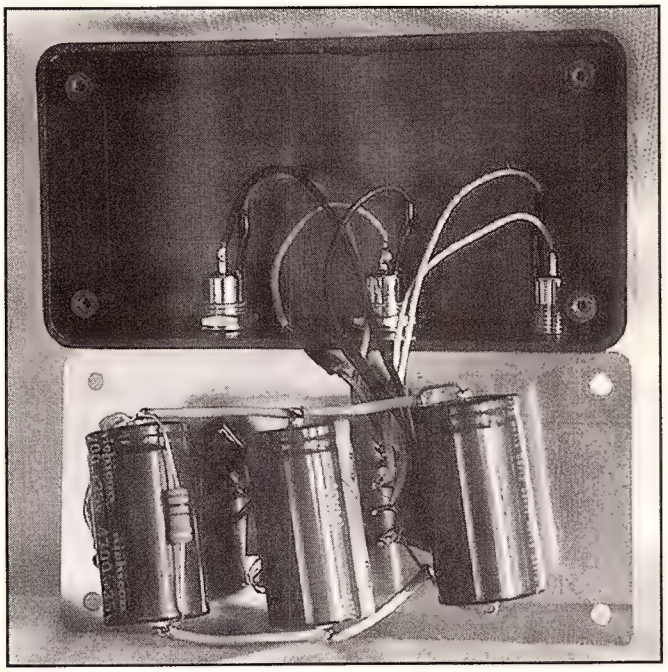


Figure 2—Schematic diagram and parts list for the Cube Tamer. Radio Shack part numbers indicated.

C1-C3—4700 µF electrolytic capacitors, 35 V dc (272-1022)
C4—0.1 µF 50 V dc capacitor (272-1069)
J1-J3—Coaxial jack (274-1576)
R1—1300 Ω, 1 W resistor
U1—7812 12-V regulator (276-1771)
U2—400 V, 4 A full-wave bridge rectifier (276-1173)
Project box, 5 1/8 x 2 5/8 x 1 5/8 inches (270-233)



A peek inside the finished Cube Tamer

Conclusion

I have tried the Cube Tamer with a variety of ac and dc wall cubes, and within the computed input ranges, the measured output under load has always been the same: 12.2 V dc with 1 mV ripple.

Ironically, the old 12-V dc cube that gave me this idea in the first place does not work with the Cube Tamer—its voltage is below the dc minimum and there is no regulation under load (I measured only about 10 V out).

I wound up using an ac cube that was labeled 13 V ac, 800 mA. I measured its no-load voltage as 15.5 V ac. (I've noticed that the voltage marked on the cube is rarely accurate, so check your cube with a voltmeter—don't trust the label.) This cube was left behind by a dead phone answering machine.

If your collection of wall cubes affords you a choice, use the cube with the greatest current capacity that is within the input voltage range. Be sure the cube's rated output current is at least as large as the current required by your rig. Pay close attention to the polarity marking on the wall cube you use; select the appropriate input jack for ac, dc center positive, or dc center negative. Although plugging a dc cube into the Tamer's ac socket will not do any great harm, be careful to use the correct dc input—the regulator will not enjoy reversed polarity. Based on the component values used in the Cube Tamer, there are input voltage limits that must be observed for safe operation: 10-18 Vac, or 15-25 Vdc.

I've received a lot of satisfaction out of this little project: a recycled transformer, an easy-to-carry power source for my QRP rig, and a project that I was able to take from concept to test in two days, just before my trip. Although I built my Cube Tamer for 12 V output, you may prefer some other voltage. The regulator ICs are available in voltages from 5 to 28 V, and there is even an adjustable one. I hope the idea works for you. Maybe I'll work you from a hotel room sometime. Of course, I still have a lot of work to do on the ideal hotel room antenna!

7 Old Albany Post Rd
Croton, NY 10520
e-mail n2htt@bestweb.net

New Products

VLF RADIO! THE SOUNDS OF LONGWAVE

◊ VLF radio is the unusual "no man's land" of the radio spectrum. It's filled with signals from military sources, beacons, experimenters, ships at sea, submarines, broadcasters, airports, time stations and natural atmospheric "radio noises." Once the mainstay of pioneer ham operators, longwave and VLF operation is becoming an "endangered species."

VLF Radio! The Sounds of Longwave, a 60-minute audio cassette narrated by Kevin Carey, *Monitoring Times*' "Below 500 kHz" columnist, preserves a wide variety of these signals, many of which have historical value, for you to hear and enjoy. Also included are reference notes, a longwave spectrum chart and a listener logsheet.

Price: $11.95 postpaid. For more information, contact Kevin Carey, PO Box 56, West Bloomfield, NY 14585; e-mail **kcarey @mdsroc.com**.

STRESS-REDUCING ROTATOR MOUNTING JOINTS FROM YAESU

◊ Yaesu's GA-2500 and GA-3000 tower mount absorber joints, made from high-density polypropylene, are designed to reduce rotator gear stress while reducing the effects of binding. Installed inside the tower between the rotator and the tower mounting plate, the joints cushion and absorb the shock produced by rotator starts, stops and wind gusts. All necessary hardware is supplied.

The GA-2500 should be used with light- and medium-duty rotators such as Yaesu's G-400, G-450 and G-800 series; the GA-3000 with heavy-duty units such as the G-1000 and G-2800 series. Both models are available from authorized Yaesu equipment dealers.

For more information, contact Yaesu at 562-404-2700.

6-M FM VOICE/DATA TRANSCEIVER FROM MFJ

◊ A perfect beginner's radio for voice, packet and data communication, MFJ's Model 9606 crystal-controlled FM transceiver is compatible with almost any TNC and is great for making voice contacts via simplex or through local repeaters.

The 10-W transceiver, dubbed the *FM Communicator*, features high-quality speech/AFSK circuitry; a dual-conversion superhet receiver; low-noise front-end amplifiers; a built-in speaker; two types of squelch; rugged construction; and an optional CTCSS tone encoder module.

The 9606 ships with crystals for the 52.525-MHz national FM voice calling frequency. Additional crystal pairs are available for $24.95. Price: $149.95. The unit is covered by MFJ's "no matter what" one-year unconditional warranty. If the MFJ-9606 isn't available at your favorite ham radio dealer, contact MFJ at PO Box 494, Mississippi State, MS 39762; tel 800-647-1800; fax 601-323-6551; **http://mfjenterprises .com**.

By Steve Ford, WB8IMY

Ham Radio on the High Iron

Pack your H-T and take your next vacation on the rails.

In 1994 I embarked on a train trip along the East Coast from Connecticut to Florida. With a laptop, a 2-meter H-T and a packet TNC, I was able to use my ample leisure time to access packet bulletin boards (BBSs) along the way. The details of my railroad "adventure" appeared in "Packet on the High Iron" in the January 1995, *QST*, page 64.

Much has changed since then. Packet has undergone enormous transition in the wake of the "Internet revolution." AMTRAK has changed, adding new equipment and service along the entire eastern seaboard. And, I've changed. I have a family now, and added responsibilities that often keep me close to home.

But into every life a few delicious plums of opportunity occasionally fall. In my case it was the rare chance to ride the rails again. Thanks to a fortuitous scheduling fluke (equivalent to all 9 planets moving into alignment) the high iron could take me to Orlando, Florida—where I had business appointments at the time—all the way from my home in Wallingford, Connecticut. AMTRAK has its new Viewliner sleeper cars on the seaboard route, and it has greatly revamped its "Silver Service." In the privacy of my room I could work on the way down and enjoy Amateur Radio on the way home.

When I broached the idea to my wife, she understood completely. (It isn't easy being married to a ham *and* a railroad fanatic.) We had the spare cash to make up for the additional cost of the sleeper, so she gave me the "green block signal" and I was on my way! This is the story of my homeward journey aboard number 92, the *Silver Star*.

An H-T for fun and a laptop PC for serious work. Notice the foldout table beneath the laptop—it doubles as a chessboard!

Settling In

If you've never ridden in an AMTRAK Viewliner or Superliner sleeper, be prepared to be impressed. The standard bedroom is about the size of a large closet, but it is entirely comfortable. You have your own water supply, washbasin, toilet, thermostat controls and so on. The Viewliner bedrooms also include a TV screen with two channels showing first-run movies, cartoons and more. These cars are clean, smooth riding and quiet—perfect for relaxing, writing or hamming!

The *Silver Star* rolled into Orlando about 20 minutes late (it would make up the time overnight). I boarded and—just like a big kid—started playing with all the buttons and gadgets in the room. The car attendant introduced herself and handed me a box containing a small bottle of wine and a beautiful long-stemmed "Silver Service" glass. (A definite collector's item.) She eyed my Yaesu VX-1 H-T, but said nothing.

Dinner in the Diner, and Beyond

By 5:30 the *Silver Star* had reached Deland, Florida, and I was enjoying dinner in the dining car. In railroad dining cars you almost never eat by yourself; someone is usually seated at the table with you. That evening my dinner companions were a young family with two children. Naturally, I pulled out the VX-1 and the conversation was underway. Before the salads hit the table, I made a quick contact through a nearby repeater. They were impressed! By the time I was ready to leave, they wanted to know more about Amateur Radio. The oldest boy asked if he could use his computer to gather more information about the hobby.

"Are you on the Internet?" I asked.

"Of course," the 10-year-old smiled. "Isn't everybody? I'm on the Web a lot."

Occasionally the train stops for 15 or 20 minutes at a station. This is the time to stroll the platform with your H-T and make a few more contacts.

"Good. Next time you're on line, go to **http://www.arrl.org**. You'll find just about everything you need there."

I thought about the boy's response as I strolled back to my room. I could tell from the bemused look on his face that I had asked a ridiculous question—at least from his point of view.

I fired up the laptop and started looking for packet signals. Five years ago I found a BBS in almost every city. I would soon discover, however, that many of them had vanished. The BBSs that remained had little activity. Quick reviews of the message lists showed stale FOR SALE listings that were weeks old, and little else. The good news was that the coastal DX PacketCluster networks were still thriving. I also picked up some Automatic Packet Reporting System (APRS) activity here and there. But it was clear that the boy's comment had been prophetic. Traditional packet BBS traffic had declined tremendously since my last visit along the Atlantic coast, giving way to the attractions of the Internet.

Putting packet aside for the time being, I switched to FM voice. As we rolled into Jacksonville at 8:30 PM, I found a simplex net on 146.46 MHz. WA4BCG was net control and he welcomed me to the group. (KE4RMV had to relay for me occasionally as the train strayed into RF "holes"!) As I chatted with the net, the same boy who had been my dinner guest an hour earlier walked past my open door.

"Want to hear this?" I beckoned. "It's a group of hams talking among themselves. We call it a *net*."

The boy listened with obvious fascination. "Hey, this is cool. Where are those people? How can they talk to us in the train? How ..."

"Everybody" may be on the Internet, I thought to myself. But Amateur Radio still has plenty of tricks up its sleeve!

Eavesdropping on AMTRAK

Later that evening I put the VX-1's extended receive and scanning functions to work. I knew that most AMTRAK crews used frequencies between 160 and 162 MHz. Their transmissions are usually brief, which can make them difficult to find. After about 15 minutes, I spotted them on 160.590 MHz. The communications were routine with messages about block signals, speed, and so on. Occasionally problems would crop up and that would make for some pretty interesting (and entertaining!) exchanges.

Legally speaking, you need to be a little careful. It's okay to monitor AMTRAK traffic and even have others listen with you, but the Communications Act forbids you from communicating the content of a transmission to an unintended recipient. It would be illegal for me, for example, to tell the person in the next sleeper compartment, "Hey, I just heard the engineer say that we're going to be late into Richmond."

Yes, I know it is one of those laws that are virtually impossible to enforce, but I suggest you play the game by the rules just the same. Besides, you never know whom you'll meet on a train. Your companion for lunch could be an FCC field engineer.

Virginia in the Morning, New York in the Afternoon

Sunshine blasted into my compartment at 8:00 AM as the big train rounded a curve outside of Petersburg, Virginia. It was a gorgeous Sunday morning and I was refreshed and ready to go. After the usual cleansing ritual, I sat back with a glass of orange juice and the Sunday paper, courtesy of AMTRAK.

I found a couple of strong repeaters on 146.94 and 146.88 MHz. I called, "This is WB8IMY, railmobile, on AMTRAK's *Silver Star*, listening," but heard no responses. It was still too early. As I scanned down below 146 MHz, however, I finally ran into some activity on the 145.43 MHz machine in Midlothian. I had a brief chat with W4RNP, but the *Silver Star* soon carried me out of range.

Once we reached Washington and the Northeast Corridor, the situation changed considerably. There was so much activity, I finally had to turn off the radio just to keep from losing my voice! (I was still recovering from a bad head cold.)

The *Silver Star* roared into New York's Penn Station on time. I regretted leaving the grand old train; it is hard to say when I'll have another chance to take a long-haul rail journey. But, there was a connecting train to catch for Connecticut and a family who wanted Dad to return in the worst way!

Tips and Tidbits

We're just slipping into the vacation season and I'm sure some of you will find yourself on the rails. By all means bring your H-T. I enjoyed good results with the less-than-one-watt output of the VX-1, but more power will help you stay within conversational range longer. An extended antenna, such as a telescoping whip, is also a good idea. If you're riding in coach, use an earphone or headphones so that you don't drive your fellow passengers batty.

Take along a copy of the *ARRL Repeater Directory* or, if you have a CD-ROM-equipped laptop, pack a copy of *Travel Plus*. Both are available from your dealer or ARRL Headquarters. When you find a repeater, don't just sit there waiting for someone to come on the air. Take the initiative! Make a call and include the fact that you are "railmobile." If anyone is listening, that will usually flush them out. And don't forget to regularly scan and call on the simplex frequencies. I was able to stir up several conversations by calling on 146.52 MHz.

If you're especially adventurous, there are some intriguing experiments you could try. Has anyone ever tried to set up an APRS station aboard a long-haul train? I don't know if a GPS receiver would work with its antenna positioned horizontally on a train window. Even if the GPS receiver functioned, could you find enough APRS stations to relay your packets? It might be worth a try. Imagine your friends and home and elsewhere being able to watch your progress across the continent on their APRS maps! If someone actually manages to pull this off, let me know.

It may also be possible to work the AO-27 FM repeater satellite from the train. You'd need a dual-band H-T with crossband transmit/receive capability at a good antenna (a dual-band dipole mounted on a sleeping compartment window, perhaps).

Above all else, enjoy the experience. Railroading is a unique pleasure that puts you in touch with travel the way it *used to be*—when getting there was half the fun. Yes, you can cram yourself into an airliner, munch peanuts with silent strangers and arrive at your destination within hours. Or, you can take the easy road, get to know your fellow human beings at little better, have fun with ham radio, and see the world from a whole new perspective.

QST

By H. Ward Silver, NØAX

Test Your Knowledge!

How's your skyhook and feeder savvy?

Nothing provokes commentary among hams like antenna and transmission line topics. But as Will Rogers once said, "It's not what we don't know. It's what we know that ain't so!" Have fun with a potpourri of questions on one of our favorite subjects.

1. To measure the vertical angle at which an antenna radiates most strongly, the (elevation/azimuth) pattern is used.

2. Which antenna feed system is unbalanced?
a. Beta
b. Gamma
c. T
d. Delta

3. In free space, a resonant dipole has an impedance that is ...
a. 50 Ω
b. purely resistive
c. purely reactive
d. equally resistive and reactive

4. Antenna traps present (high/low) impedances at their resonant frequencies.

5. What is the major factor affecting velocity of propagation in coaxial cable?
a. braid weave pattern
b. jacket material
c. center conductor diameter
d. center insulator material

6. Most coaxial cable uses what material for the center insulator?
a. polystyrene
b. Nylon
c. polyethylene
d. Teflon

7. The popular G5RV-style antenna uses an impedance-matching stub made from what type of feed line?
a. ladder line
b. high-impedance coax
c. Hardline
d. optical

8. An omnidirectional array made of crossed dipoles is called...
a. a turnstile
b. cross-polarized
c. planar
d. halo

9. Baluns are used to change _____ loads into _____ loads.

Bonus. This receiving antenna and a refreshing drink share the same name. What is it?

22916-107th Ave SW
Vashon, WA 98070

Total Your Score!

There are a total of nine possible answers in this quiz, not including the bonus question. Give yourself one point for each correct answer.

7—9	Very good! You know your skyhooks well!
4—6	Not an antenna "guru," but getting there.
1—3	You need to spend some time with the *ARRL Antenna Book*.

Answers

1. elevation
2. b
3. b—It doesn't matter whether the antenna is in free-space or not—at resonance the impedance is completely resistive
4. high—Antenna traps perform isolation functions at their design frequencies
5. d
6. c—Some cables use foamed polyethylene, others solid. Still other specialty cables use Teflon.
7. a
8. a—These are good, simple antennas for low-Earth-orbiting satellites
9. balanced, unbalanced (or vice versa).
Bonus. Dr. Harold Beverage invented the Beverage as a low-noise, directional receiving antenna for low-frequency signals.

New Products

HIGH-PERFORMANCE DUAL-BAND ANTENNA FOR HAND-HELDS

◊ Comet's new SMA-503, a high-performance dual-band whip for 2 m and 70 cm hand-helds, is 8.75 inches tall and offers increased performance when compared to smaller stock antennas. The '503 fits today's micro-size H-Ts with miniature SMA antenna connectors. Price: $33.95. If Comet Amateur Radio products aren't available from your local dealer, contact Comet/NCG, 1275 N Grove St, Anaheim, CA 92806; tel 800-962-2611, fax 714-630-7024, **http://www.cometantenna.com**.

AFFORDABLE DMM FROM FIELDPIECE

◊ The LT78, an affordable, full-function digital multimeter (DMM) for field-service technicians, is the newest addition to Fieldpiece's full line of test equipment and service kits. The professional-grade tester has a full complement of test ranges, plus several millivolt and microamp ranges not normally found in low-cost units. Other features include data hold; max hold and continuity. The LT78 works with all Fieldpiece accessories and is housed in a protective rubber holster.

Price: $59. For more information, contact Fieldpiece at 231 E Imperial Hwy, Suite 250, Fullerton, CA 92835; tel 714-992-1239, fax 714-992-6541.

By Scott Porter, N1SP

Via The Bureau

A glimpse inside the US incoming QSL bureau system.

When you work your first DX station, don't be surprised if he tells you that his QSL will be on the way to you "via the bureau" (depending on his command of English, it may sound like "burro"). What exactly does this mean?

In as many as 260 countries throughout the world, ham organizations maintain miniature post offices known as *QSL bureaus*. The bureaus receive QSLs from hams in their respective countries. These QSLs are then sorted and mailed to bureaus in the destination countries.

Most QSLs bound for the United States arrive at the regional bureaus in each of the US call areas. The regional bureaus then make the final sort for mailing to individual hams. You'll find a list of regional bureaus below, or see the continually updated list on the Web at **http://www.arrl.org/qsl/qslin.html**.

To receive your QSLs you must keep self-addressed, stamped 5 ×7 or 6 ×9 envelopes on file at the bureau that services your call area *according to the prefix of your call sign*. This sometimes leads to misunderstandings. For example, if your call is W8ABC and you live in California, you would send your envelope to the W8 bureau in Columbus, Ohio—*not* the W6 bureau in Sun Valley, California! You can also maintain "credits" at the bureau (by periodically sending checks or money orders) that they can use to purchase envelopes and postage.

ARRL members can send their outgoing QSLs via the bureau system as well—thanks to the ARRL Outgoing QSL Service. Just presort the cards alphabetically by the parent call-sign prefix (AP, C6, CE, DL, ES, F, G, JA, LY, etc.). Addresses are not required! Enclose proof of current ARRL membership. This can be in the form of a photocopy of the white address label from your current copy of *QST*. You can also write on a slip of paper the information from the label, and use that as proof of membership. A copy of your current membership card is also acceptable. Also enclose a check for $4 for each pound of cards you send (a pound is about 150 cards). A package of 10 cards or fewer sent in a single shipment costs only $1. Eleven to 20 is $2. Twenty-one to 30 is $3. Write your call sign on the check, bundle everything together and mail the package to: ARRL Outgoing QSL Service, 225 Main St, Newington, CT 06111.

The wheels of the bureau system grind slowly with volunteers doing much of the work. As a result, cards tend to move at a snail's pace. (Don't expect to see cards from DX stations for at least a year, possibly longer.) Even so, the system is fairly reliable and, best of all, it is very inexpensive.

That Little Brick Building

When I earned my license in 1976 and first heard about the bureau system, I thought my regional bureau was housed in a little red brick building right down the street from W1AW and the ARRL. I envisioned a quaint little cluttered place that had several guys wearing suits and working diligently to get QSL cards to all the deserving hams here in New England.

Some of my original ideas about the bureau changed through the years. I discovered that the proper size and weight of the envelope are important. Too small and my cards would come back folded or mangled; too large and they don't fit the bureau's stor-

ARRL's Incoming QSL Bureau System

All first-area call signs:
W1 QSL Bureau*
YCCC
PO Box 80216
Springfield, MA 01138-0216

All second-area call signs:
ARRL 2nd District QSL Bureau*
NJDXA
PO Box 599
Morris Plains, NJ 07950

All third-area call signs:
Pennsylvania DX Association
PDXA
PO Box 100
York Haven, PA 17370-0100

All fourth-area call signs with single-letter prefixes (K4, N4, W4):
Mecklenburg Amateur Radio Club
PO Box DX
Charlotte, NC 28220

All fourth-area call signs with two-letter prefixes (AA4, KB4, NC4, WD4, etc):
Sterling Park Amateur Radio Club
Call Box 599
Sterling, VA 20167

All fifth-area call signs:
ARRL W5 Incoming QSL Bureau*
PO Box 50625
Midland, TX 79710

All sixth-area call signs:
ARRL Sixth (6th) District DX QSL Bureau*†
PO Box 1460
Sun Valley, CA 91352

All seventh-area call signs:
Willamette Valley DX Club Inc*
PO Box 555
Portland, OR 97207

All eighth-area call signs:
8th Area QSL Bureau
PO Box 182165
Columbus, OH 43218-2165

All ninth-area call signs:
Northern Illinois DX Association*
Box 1450
Woodstock, IL, 60098

All tenth-area call signs:
WØ QSL Bureau*
PO Box 4798
Overland Park, KS 66204

All Hawaiian call signs:
KH6 QSL Bureau*
Wayne Jones, NH6GJ
PO Box 788
Wahiawa, HI 96786

All Alaskan call signs:
Alaska QSL Bureau*
P.O. Box 520343
Big Lake, AK 99652

All Puerto Rico call signs:
Puerto Rico QSL Bureau*
PO Box 9021061
San Juan, PR 00902-1061

All US Virgin Island call signs:
Virgin Islands ARC
GPO Box 11360
Charlotte Amalie, VI 00801

All Guam call signs:
MARC
Box 445
Agana, Guam 96910

QSL Cards for Canada may be sent to:
RAC Incoming Bureau
Loyalist City Amateur Radio Club
Box 51
St. John, NB E2L 3X1

All US SWL calls
SWL QSL Bureau
Mike Witkowski, WDX9JFT
4206 Nebel St
Stevens Point, WI 54481

*These bureaus sell envelopes or postage credits. Send an SASE to the bureau for further information.

†These bureaus can only accept specific sized envelopes. Send an SASE to the bureau for further information.

age space (and the post office charges more!). Not paying attention to postal increases meant that my envelopes did not have enough postage on them when there were finally enough cards to send to me.

It became painfully clear that I would have to be very patient if I wanted cards to come to me by the bureau. Almost never did I receive cards that were less than a year old. Many were two or more years old. I learned that sometimes, "QSL 100% via the bureau" really meant, "After you send me yours and I get around to it, I'll eventually send my pile of cards to my country's bureau."

Bureau Reality

A little over 20 years later I became the manager of the W1 QSL Bureau. (By the time you read this, however, I will have passed the baton to Burton Eldridge, W1ZS.) Some of my misconceptions changed drastically when I became manager and saw what actually goes into the operation. The W1 Bureau is not a little brick building in Newington. Like many incoming bureaus around the country, it is really not in one place at all. Currently the W1 bureau is in the homes of 26 hams located in four New England states. The W1 bureau processes nearly 500,000 cards each year. That translates to about 42,000 cards per month!

Every incoming bureau has its own internal procedures, but they all tend to operate in pretty much the same fashion. Let's take a quick look at how things are done in W1 land.

In One Door, Out the Other

The W1 bureau's post office box gets emptied every two to three weeks. Boxes containing cards from foreign bureaus and from the ARRL Incoming QSL Service are distributed to a couple of people who presort the cards into 26 groups according to the first letter of the call-sign suffix. Any other letters come to the bureau manager. He also records the credits, consisting of SASEs, checks, and, in some cases, cash (not a good idea!). The manager picks up the presorted cards and credits (money to cover postage increases and envelopes) and sends them to the final sorters—26 in all—every 6 to 8 weeks. The volunteers who do the final sorting also handle the final mailing tasks. They are the last link in the chain between the DX station and you.

Some of the sorters use computers, some don't. Some have e-mail and packet, some don't. They all have other things to do besides their unpaid volunteer work for the bureau. Their identities are not made public except and unless they wish to reveal who they are. Most choose to remain anonymous rather than be pestered for requests for account status or "Hey, I've sent out hundreds of cards and haven't gotten any bureau cards in a long time..."

You can trust in the fact that the sorters will get your treasured cards to you. All it takes is a little patience.

Make Life Easier for your Bureau

There are a number of things you can do to make life easier for your bureau and avoid delays in getting your cards:

❑ Keep us notified of call and address changes.

❑ Keep credits (or SASEs) on file for each call you've used in the last 5 years.

❑ Contact the right bureau. Portable means nothing to us. N6BV/W1, K5FUV/W1, KL7DN/W1 use the W6, W5 and KL7 bureau's even though they live in New England.

❑ If you send SASEs, make sure they are 5×7s or 6×9, nothing smaller, nothing larger. If you're just starting the DX game, drop an SASE to your bureau and ask them for a list of their requirements.

❑ If you send SASEs, affix one unit of postage to each and enclose loose postage for further weight and postal rate increases.

❑ Don't make us chase you. We are not a warehouse for your cards.

❑ Do notify the FCC of your mailing address!

❑ Do not send us your outgoing QSLs! Send them direct to the station or use the ARRL Outgoing QSL Service.

❑ Put your call on everything you send us. Write legibly, preferably type or print.

❑ Be patient.

661 Fullam Hill Rd
Fitzwilliam, NH 03447
e-mail n1sp@cheshire.net

New Products

30-A VARIABLE-VOLTAGE DC POWER SUPPLY FROM MFJ

◊ Designed for experimentation or powering a desktop full of 13.8-V dc ham gear, MFJ's new 30-A variable dc power supply is adjustable (1-14 V dc), regulated and has an automatic shut-down circuit to protect against current overloads.

Powered by 117 V ac, the Model 4035MV features front-panel fuse holders and lighted meters (volts and amps), three sets of output terminals, a cigarette lighter socket for powering mobile gear, a quiet internal cooling fan and more.

Price: $149.95. The 4035MV is backed by MFJ's "No Matter What" one-year limited warranty. For more information, see your local Amateur Radio products dealer or contact MFJ, at PO Box 494, Mississippi State, MS 39762; tel 800-647-1800; fax 601-323-6551; **http://www .mfjenterprises.com**.

Strays

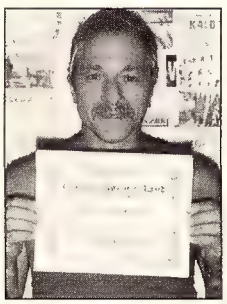
AK-SAR-BEN AUCTION

◊ The Ak-Sar-Ben ARC (AARC) in Omaha, Nebraska is holding their annual Ham Radio Auction on Sunday, May 3, 1998 at 9:30 AM. The auction will be held at Millard Social Hall, 10508 S. 144th St, Omaha, NE, located on Hwy 50 just south of Interstate 80. Talk-in will be on the KØUSA repeater 146.94. Registration and check-in will begin at 7:30 AM with the auction starting at 9:30 AM. Admission is free. If you have any questions contact Ed Edwards, KØIL, at 402-552-5425, or e-mail **k0usa@qsl.net** or **k0il@qsl.net**, or visit their Web site at **http://www.qsl.net/k0usa**.

CALL HIM "YOUR HONOR"

◊ It may be just a little more difficult to pass ordinances against ham antennas in Wilmington, North Carolina. Hamilton "Ham" Hicks, KB4BR, is the newly elected *mayor*. He is shown here operating the Azalea Coast Amateur Radio Club station AC4RC during the North Carolina QSO Party.

GOLD AWARD WINNER

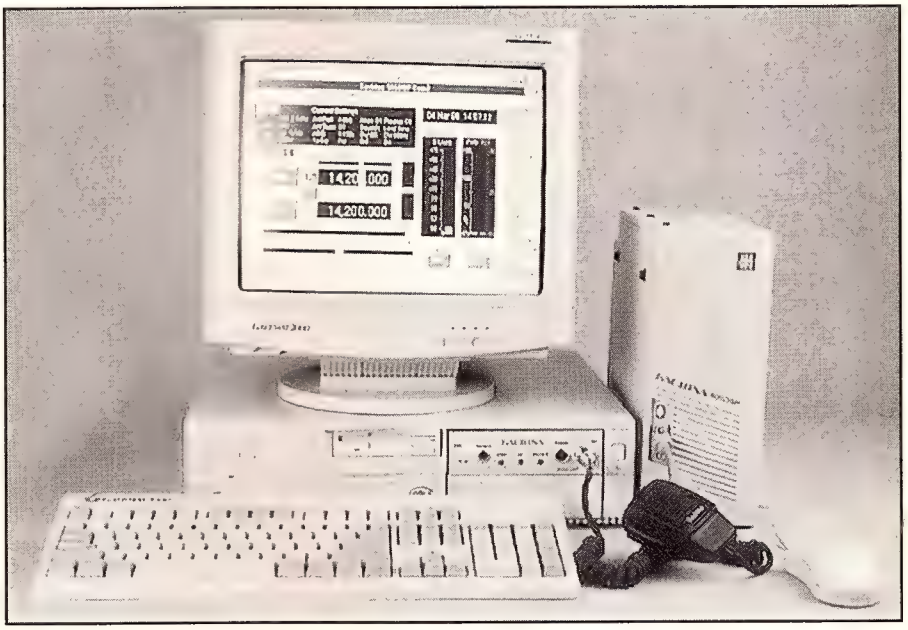


◊ Marino Coppellotti, N1PVP, of Carver, Massachusetts, is the first ham in the US to receive the Canadian Provinces Gold Award, and only the 20th recipient in the world. The Heritage Amateur Radio Club in Cobourg, Ontario, Canada, sponsors the award. The purpose of the award is primarily to encourage more conversations among Canadians, but the award is open to foreign hams as well. There are three levels for the Canadian Provinces Award: bronze, silver and the prestigious gold level. More information about the award can be found on the Heritage Amateur Radio Club site on the Web at **http://www.eagle.ca/~harc/**.

Edited by **Rick Lindquist, N1RL**• Senior Assistant Technical Editor

Kachina 505DSP HF Transceiver

Reviewed by Larry Wolfgang, WR1B
Senior Assistant Technical Editor



Why use knobs if you have *Windows*?" Kachina Communications asks on its Web site. "Sometimes there's nothing quite like a tuning knob," many hams would respond. Simply put, the only "knobs" on the 505DSP exist on the *Windows*-interface screen of the user-supplied computer that controls the radio. Make no mistake, however. The 505DSP might be novel in the ham radio world, but it's no mere novelty. This is a "real" radio with lots of features, flexibility, and performance.

Everyone agrees that Kachina—an Arizona-based company that's been building commercial transceivers for 20 years—has taken a pretty radical approach with its first Amateur Radio offering. If the Kachina 505DSP doesn't mark the next paradigm shift in Amateur Radio transceiver design, it certainly represents a major leap in user-interface design. The notion was intriguing enough to attract hundreds—perhaps thousands—of hams to the Kachina booth at last year's Dayton Hamvention—just for a look at the radio that some already are calling the future of Amateur Radio transceivers—where hardware takes a back seat to software, and a new radio is only another "rev" away. Indeed, we encountered this phenomenon while reviewing the 505DSP.

The Hardware Side

Two boxes comprise the Kachina 505DSP. The larger box is the actual transceiver "guts." It's about the size of a Kenwood TS-450. The much smaller box is the "control head." Designed to fit into a spare drive bay on your computer, the only actual "control" is a push-button power switch! Jacks are provided for the microphone, speaker, headphones, key and paddles. A connector wired to the computer's back panel provides for the serial port connection to the radio and the computer. (The control head also can be used externally, but with a different wiring interface.)

On the radio box itself are a front panel connector for the control cable (we wondered why Kachina didn't put it on the rear apron; it gets in the way if you put the radio box on your operating desk) plus a green LED to indicate that the radio is turned on. The rear panel of the radio box includes a power connector, a ground stud with thumbscrew, and two SO-239 antenna connectors. Via the menu you can assign ports to specific bands or set one antenna port for transmit and the other for receive. A DB-25 connector is available for audio accessory connections, such as for a multimode communications processor or modem. A DB-9 connector provides connections for an external automatic antenna tuner (our unit had the optional, built-in tuner), and a 15-pin sub-D connector lets you hook up an external power amplifier. An RJ12 connector (similar to a modular telephone connector) is used with an optional cable to connect the radio to the computer when you mount the control head outside of a computer.

Yes, in addition to the radio, you'll also need a computer, but system requirements are pretty minimal—a '386DX or higher processor and 4 MB of memory (8 MB recommended), at least 2 MB of free hard disk space, and a serial port. Your computer must be running Microsoft *Windows* 3.1, *Windows 95* or *Windows NT*. This is just the place for that now outmoded castoff to enjoy a second life, but a decent monitor is a must.

You will also need a 4 or 8-Ω speaker. It's possible to use your computer sound card if you have one, but you will have to feed the audio from the control head front panel to the sound card via an external cable, even if you mount the control head in a computer drive bay. You will only get audio on the left channel, however.

Bottom Line

The first virtual front panel, PC-controlled HF transceiver, the Kachina 505DSP offers solid performance that compares favorably with other radios in its price class. The relegation of functionality from hardware to software and firmware opens broad vistas of future capability with this transceiver. This could be the paradigm shift we've been anticipating. Kachina is to be commended for its first Amateur Radio offering.

What's in the Box

Kachina provides no schematics with the radio (they're available free of charge by request), but there's an interesting description of the operating theory on Kachina's Web site, **http://www.kachina-az.com**. Here are some highlights. The 505DSP is a dual-conversion radio, with IFs at 75 MHz (for good image rejection) and 40 kHz (for IF DSP). The first IF uses a 20-kHz wide roofing filter to remove the second image component and nearby interference. The 40-kHz IF section has a 15 kHz bandwidth. The signal is amplified, and the digital signal processing unit provides additional selectivity and processing. In other words, the 505DSP relies heavily on DSP, not crystal filters, for bottom-line selectivity enhancement. The Kenwood TS-870S (see "Product Review," *QST* Feb 1996) is the only other transceiver on the market that depends this heavily on DSP.

Table 1 —Kachina 505DSP serial number 91900105

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency coverage: Receive, 100 kHz to 30 MHz; transmit, 1.8-2, 3.5-4, 7-7.3, 10.1-10.15, 14-14.35, 18.068-18.168, 21-21.45, 24.890-24.990, 28-29.7 MHz.	Receive, 30 kHz to 30 MHz; transmit, as specified.
Modes of operation: SSB, CW, AM.	As specified.
Power requirement: Receive, 2 A; transmit, 25A (maximum).	Receive, 2 A; Transmit, 21 A.
Size (height, width, depth): 11.6×4.5×12.6 inches; weight, 11.6 pounds.	
Receiver	*Receiver Dynamic Testing*
CW sensitivity: Not specified.	Minimum discernible signal (noise floor), 500 Hz filter (see text):
	Preamp off / *Preamp on* 1.0 MHz: –134 dBm / –146 dBm 3.5 MHz: –133 dBm / –140 dBm 14 MHz: –133 dBm / –142 dBm
AM sensitivity (60% modulation): Preamp off, 1.0 μV; Preamp on, 0.6 μV.	10 dB (S+N)/N, 1-kHz tone, 30% modulation: *Preamp off* / *Preamp on* 1.0 MHz: 1.8 μV / 0.4 μV 3.5 MHz: 1.9 μV / 0.6 μV
Blocking dynamic range: Preamp off, 115 dB at 20 kHz spacing; 118 dB at 50 kHz spacing.	Blocking dynamic range, 500 Hz filter: *Preamp off* / *Preamp on* 3.5 MHz: 96 dB / 100 dB 14 MHz: 103 dB / 103 dB
Two-tone, third-order IMD dynamic range: Preamp off, 96 dB typical.	Two-tone, third-order IMD dynamic range, 500 Hz filter: *Preamp off* / *Preamp on* 3.5 MHz: 98 dB / 94 dB 14 MHz: 99 dB / 97 dB
Third-order intercept: Preamp off, +18 dBm typical.	*Preamp off* / *Preamp on* 3.5 MHz: +14.0 dBm / +1.0 dBm 14 MHz: +15.5 dBm / +3.5 dBm
Second-order intercept: Preamp off, +49 dBm typical.	Preamp off, +49 dBm; preamp on, +30 dBm.
S-meter sensitivity: Not specified.	S9 signal at 14.2 MHz, preamp off, 46 μV; preamp on, 11 μV.
Squelch sensitivity: Not specified.	At threshold, preamp on: SSB, 14 MHz, 0.8 μV.
Receiver audio output: 2 W at 5% THD into 4 Ω.	2 W at 5% THD into 4 Ω.
IF/audio response: Not specified:	Range at –6 dB points, (bandwidth): CW-N (500 Hz filter): 628-1370 Hz (742 Hz); CW-W (1 kHz filter): 432-1610 Hz (1178 Hz); USB (3.5 kHz filter): 436-3276 Hz (2840 Hz); LSB (3.5 kHz filter): 436-3066 Hz (2630 Hz); AM (6 kHz filter): 152-2570 Hz (2418 Hz).
Spurious and image rejection: 80 dB.	First IF rejection: preamp off, 84 dB; image rejection, preamp off, 156 dB.
Transmitter	*Transmitter dynamic testing*
Power output: SSB, 100 W; AM, 25 W carrier.	As specified.
Spurious and harmonic suppression: 60 dB	53 dB. Meets FCC requirements for spectral purity for equipment in its power output class and frequency range.
CW keyer speed range: 5-80 WPM.	As specified.
CW keying characteristics: Not specified.	See Figure 3.
SSB carrier and undesired sideband suppression: 55 dB.	As specified.
Third-order intermodulation distortion (IMD) products: Not specified.	See Figure 4.
Transmit-receive turn-around time (PTT release to 50% audio output): Not specified.	S9 signal, 24 ms.
Receive-transmit turn-around time (tx delay): Not specified.	SSB, 31 ms. Unit is suitable for use on AMTOR.
Composite transmitted noise: Not specified.	See Figure 5.

Note: All dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz unless otherwise noted.

The Kachina 505DSP generates and detects SSB signals using the phasing method—the same method used in the early years of SSB. Kachina uses DSP to introduce the required 90° phase shift to cancel one sideband and reinforce the other. Unlike the phasing systems of years ago, however, the DSP is able to maintain a *constant* 90° phase shift for all frequencies through the system. Many believe a phasing sideband signal has better audio quality than one produced using the now-common filter method. The excellent audio reports we got tend to bear that out.

A direct digital synthesis (DDS) and phase-locked loop (PLL) hybrid frequency synthesizer forms the first local oscillator. The design allows tuning steps of less than 0.5 Hz, but the control software limits you to 1-Hz steps. The reference oscillator is microprocessor-compensated against temperature variations. A built-in test feature permits using a reference signal such WWV to automatically calibrate the oscillator.

The radio is constructed computer-style, with a motherboard and plug-in cards. The DSP features are included in the radio's firmware using Motorola HC-16 assembly-language programming. During the review period, our radio had to be returned to Kachina for repair due to an operator error (more on this later). When it came back, Kachina had upgraded our unit with the latest firmware. Kachina Senior Design Engineer Doug Smith, KF6DX, told us that Kachina's policy is to upgrade the firm-

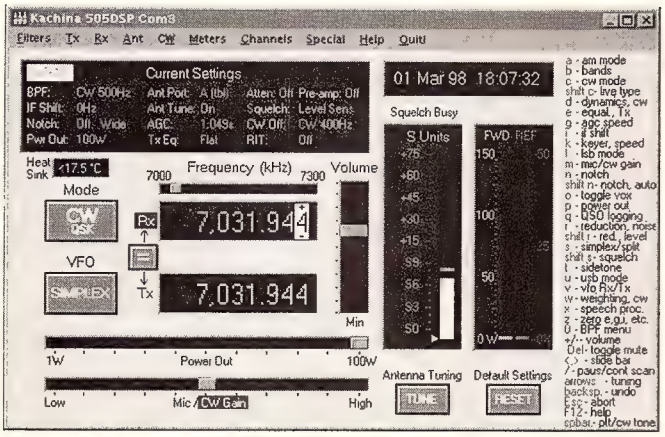


Figure 1—The 505 DSP's virtual "front panel."

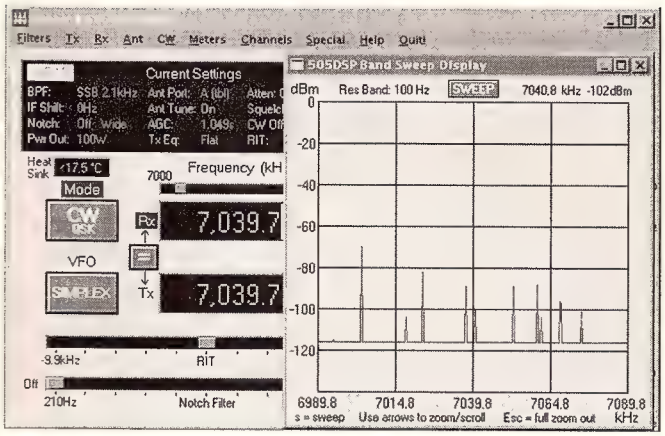


Figure 2—The Band Sweep mode.

ware (within the limitations of any hardware changes) whenever a radio comes back for service. Smith also said that 505DSP owners will be able to upgrade their own radios by using a plug-in PCMCIA card. This is a credit-card sized board that plugs into one of two slots on the microprocessor board.

Software and Documentation

Software for the 505DSP arrives on 3½-inch floppies. As with most *Windows* software, it's a snap to install the Kachina control and interface software on your computer. Just run the install program, and follow the directions. Software upgrades for the Kachina 505DSP are free and downloadable from the company's Web site.

The *Installation and Operation Guide* is a top-notch, glossy publication. It presents information about the radio in a clear, concise manner. Unfortunately, at only 17 pages, that information is pretty thin! The instructions for connecting the radio and control head are easy to follow. Clear illustrations show how to wire the various plugs and connectors. What you won't find there, however, are detailed descriptions about how to use the software that creates the user interface. The booklet does contain a brief description of features and even a handy reference card listing the various keyboard "shortcuts" to commonly used commands. But information about how to properly adjust many of the controls is lacking. Where do I set the mike gain slider bar, for example? How do I set up the radio to operate RTTY or other digital modes?

As with much computer software these days, you can call up a Help screen describing just about any software feature or radio "control." While these descriptions covered what I intuitively knew about the control or feature by reading its label, they didn't supply enough information about how to actually use the feature or adjust a control. Only by chance did I discover that clicking on the TX frequency display allows you to listen on the transmit frequency during split-frequency operation.

Kachina Communications has been very responsive in this regard. The company now posts a series of *Application Notes* on its Web site that discuss the radio and how to use various features. This information answered more questions than I even realized I had about how to use the radio. (It also introduced me to a newer version of the control software, but more about that later.)

I even found a document that describes the command structure used to control the various radio features. Presumably, a veteran programmer could write the code to control the radio from within their own application, creating a custom user interface.

All of this suggests that the 505DSP is hardly cast in stone but a dynamic product that will grow and develop as Kachina receives more user feedback and comes up with new features. Kachina plans to incorporate the *Application Notes* onto the Help screens in its next software revision.

Imagine the Possibilities

Since the radio has no controls, there is no need to locate the transceiver box on your operating table. In fact, you don't even have to locate the box in your *shack*!

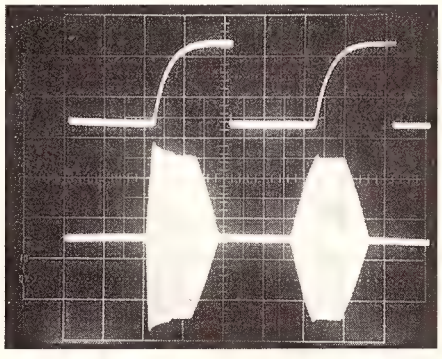


Figure 3—The default CW keying waveform for the Kachina 505DSP showing the first two dits in full-break-in (QSK) mode using external keying. The equivalent keying speed is 60 wpm. The upper trace is the actual key closure; the lower trace is the RF envelope. Horizontal divisions are 10 ms. The transceiver was being operated at 100 W output at 14.2 MHz. .

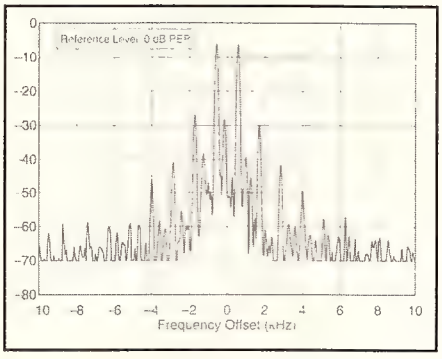


Figure 4—Worst-case spectral display of the Kachina 505DSP transmitter during two-tone intermodulation distortion (IMD) testing. The worse-case third-order product is approximately 36 dB below PEP output, and the worse-case fifth-order product is approximately 44 dB down. The transceiver was being operated at 100 W output at 24.950 MHz.

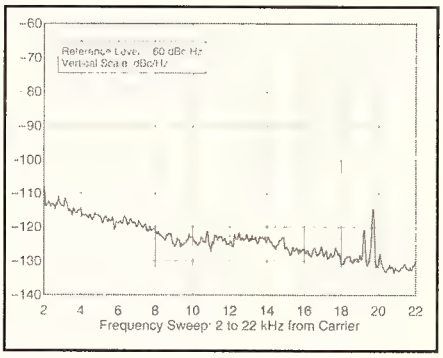


Figure 5—Worst-case tested spectral display of the Kachina 505DSP transmitter output during composite-noise testing. Power output is 100 W at 3.5 MHz. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier.

Kachina supplies an 8-foot control cable and offers optional 25 and 75-foot cables. Using the 75-foot cable (the maximum) means you could locate the radio in your basement—next to the antenna-cable entrance, for example—while your computer and control head remain in your first or second-floor shack.

Several operators who tried the 505DSP speculated about remote control over a telephone line or the Internet. Kachina reports it's done some testing using pairs of both commercial digital simultaneous voice and data (DSVD) and analog simultaneous voice and data (ASVD) modems. While their system worked, design engineer Smith indicated that the transmitted voice quality was not as good as they wanted. Kachina says it's close to announcing its own SVD system using standard modems and external analog/digital converters.

It's All About the User Interface

Besides solid performance and interference-fighting features, front-panel layout is the most critical issue that determines how much I'll enjoy operating a radio—and this holds true even for radios employing a "virtual" front panel. If the control knobs and buttons are too close together or illogically positioned, I'll always feel as though I'm fighting with the radio. In this regard, the 505DSP has a number of things in its favor.

By using almost the entire computer screen to display operating conditions and control positions (see Figure 1), Kachina has found a way to appeal to my clumsy side. I can position a mouse cursor with sufficient precision to click on a menu item or control display area. The huge frequency readouts (one for transmit, one for receive) are easy to read even if I lose my glasses! I can read the S meter without squinting, and I can grab the mike gain slider bar with the mouse and drag it to a new position quickly without bumping another control.

Some areas can display data or information in a variety of ways. For example, the S meter (a vertical bargraph) can display received signal strength in S units, volts or dBm (try *that* on your conventional rig!). There are two transmit meters. The left side can display ALC or forward power while the right side can display reflected power or VSWR. A Current Settings box at the top left—just above the frequency readouts—shows which features are enabled. A mouse click can activate these features or call up the slider bar for a particular control. For example, clicking on **PRE-AMP** toggles the preamp on and off. Clicking on **RIT** brings up the RIT slider control. Clicking on **BPF** (bandpass filter) brings up a list of DSP filter choices.

For those uncomfortable with mousing around, a list of keyboard shortcuts and other keyboard commands runs down the right side of the display. Type **K** and the keyer-speed slider pops up. Type **C** to change to CW mode or **B** to bring up the band list. It takes a bit of getting used to, but you can control many features without the mouse. The transmit and receive meters and frequency displays occupy most of the screen's center.

But old habits die hard. The one place I missed a conventional knob most was for tuning the radio. It's not that it's *difficult* to tune the Kachina 505DSP—it's just different. There are a couple of ways. The 505DSP lets you enter a frequency directly by using the Rx or Tx menus and selecting the Rx or Tx Frequency option. This is a quick and easy way to jump to a specific frequency. Or, click on any digit to make it active, then click on the + or – symbol above or below the highlighted number to tune up or down, respectively. Or, tune using the cursor (arrow) keys on your keyboard. Left and right arrows move the active digit; up and down keys change the frequency. Holding the **SHIFT** key along with the up or down arrow key changes the selected digit in steps of 5. While I could move up and down the band with ease using this technique, *tuning* up and down the band still left me longing for a real knob. Selecting steps of 100 Hz or more changes the frequency rapidly, but isn't a very good way to listen for activity. Steps of 1 or 10 Hz are much better for tuning the band, but can be painfully slow. Each single key press changes the frequency by one digit. If you hold the key down, the radio will begin to tune at a faster rate.

With a knob, however, you can spin faster until you hear a signal then nearly instantly slow to a fine-tuning pace. With a knob, you can quickly spin across a signal, rocking back and forth to zero in. Doing that using a mouse or cursor keys is a little more cumbersome, but—as with the transition from analog to digital readouts—perhaps it will become second nature, and most hams will get used to the idea. For those who can't or won't, however, Kachina says it soon will offer an optional outboard tuning knob (see Figure 6).

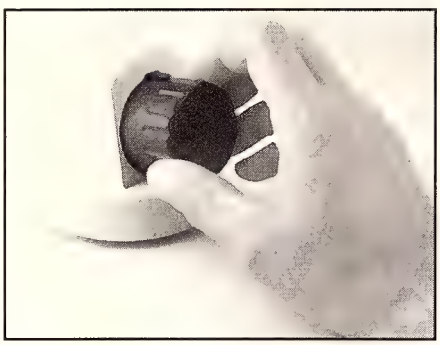


Figure 6—A pre-production model of the Model 505TK tuning knob option for the Kachina 505DSP. Kachina calls the external knob "a concession to certain users and not part of our core design philosophy." Kachina believes that once 505DSP owners get used to mouse-and-keyboard operating, the knob will become "superfluous."

The Model 505TK—which features a large, dimpled knob and a hefty cast-metal base so it will stay in place—uses an additional serial port on the computer. It also carries a hefty $199.95 suggested retail price tag. The pre-production unit we looked at worked well (it required loading another software revision) and fit in nicely on the operating desk, next to the mouse and the keyer paddle. Activating the damping lever adds a fixed amount of drag. The knob will adjust only the digit selected on the screen. For general SSB and CW tuning, it worked well with the 10 Hz digit.

The software boasts 100 memory channels. Selecting Recall on the Channels menu displays four of those channels in the Current Settings window. You can scroll with the arrow keys (but not the mouse) through the 100 listings and select the desired data by clicking on it. The screen will jump back to the Current Settings display with the selected frequency, mode, AGC and BPF settings. When you want to save a memory channel and its associated settings, go to the Save item on the Channel menu. The only way to know which channels already have data that you may not want to overwrite is to recall the channels before saving and selecting the channel number to which you want to save the new data.

You can also save 16 sets of data to the function keys—what Kachina calls "snapshot keys." Keys **F1** through **F8** and **CTRL+F1** through **CTRL+F8** recall the full operating parameters stored in those locations. This can be a real time-saver, similar to "band-stacking registers" on some radios.

Given the broad possibilities of a computerized user interface, we questioned why the 505 DSP software limits you to Kachina's idea of what the display should look like. For example, two Kenwood radios—the TS-870S and the TS-570D (see "Product Review" *QST* Jan 1997)—include Kenwood's *Radio Control Program*. The Kenwood system allows you to customize the interface to suit your needs. It even allows you to create different displays for different applications. Something along these lines for the Kachina would be a real plus.

Users raised other questions: Why can't you view the transmitted power output and the ALC at the same time? Why do the meters have to take up so much space? Do we *really* need separate receive and transmit frequency displays to operate simplex? Why can you only have two control sliders on the screen at any one time (and why does it seem that the one you need never is one of those displayed)?

It would be especially nice to have a CW operator screen with buttons to allow quick access to the nine CW buffers (59 characters max) included in the latest software (they're now available via **CTRL+**<*number*> keystrokes). This would make it a real memory keyer. By the way, the latest software also included "live type" CW capability, some-

thing like the Patcomm PC-16000 offers (see "Product Review," *QST* Feb 1998), but no CW decoding.

Since it's all software, we wondered why didn't Kachina include a digital modem. What about integrated digital mode software for RTTY, AMTOR and PACTOR and maybe even CW? How about a slow-scan TV decoder? Kachina says these are on the long-term drawing board. The goal, Smith says, is to develop "a totally integrated station environment based around a PC."

Some controls didn't work the way we wanted them to. RIT is one good example. Click on **RIT** in the Current Settings box, and drag the RIT slider bar for the appropriate offset for the off-channel signal. Click on **RIT** under the slider and you can quickly return to the original frequency—but the 505DSP "forgets" the RIT setting you'll need when the off-frequency station transmits again. Kachina says one way around this is to use the **Z** key to zero the offset. Then, use the **BACK SPACE** key, which undoes any previous command, and the **SHIFT+BACK SPACE** combination to toggle back (a "redo" command, in effect). Provided you haven't issued another command in between, this lets you recall the offset frequency instead of clearing it altogether—although being able to quickly clear RIT is certainly an advantage, especially while contesting. You can also use split mode.

Filter selections are supposed to be mode independent, with the exception of AM, which is always 6 kHz. We found it did not work this way, however. For example, if you set the CW filter default to wide, the filter selection initially stays with the mode. However—no matter how the filter is set—once you toggle through AM, the filter goes back to 2.4 kHz the next time you select SSB or CW.

If you select the narrow CW filter as the default, things really get screwy. Then, you may get either 500 Hz or 2.4 kHz for CW, USB and LSB, depending upon which side of the **MODE** button you click. Kachina says it's fixed this.

Gee, Look What We Can Do With Software!

A few of the Kachina 505DSP's features fall into the "nifty" and "somewhat useful" categories. For example, after using the automatic antenna tuner with your antenna, you can have the radio collect the impedance data for that antenna and draw a Smith Chart display (as far as we can determine, this is the first radio ever to offer this feature). You might use this Smith Chart data to help you design and adjust an impedance-matching circuit for the antenna feed point.

Another nifty feature is the Band Sweep Display (see Figure 2). This display is a spectrum analyzer that measures and visually depicts signals present across a range of frequencies. When you select the Band Sweep Display under the Special menu, a setup screen allows you to enter various sweep parameters. You can enter a sweep center frequency, but the default is the current receive frequency. You can also select the frequency span, the frequency resolution, and single or continuous sweep. Like the Band Scope on the popular ICOM IC-706 transceivers, the 505DSP receiver mutes during the sweep. The resulting display gives you an idea of the number and strength of signals on the band. The really neat part: if you see an interesting signal on the display, just click the cross-hairs mouse cursor on the signal peak and the radio switches to that frequency!

The 505DSP contains a built in logger, a standalone program called *KCLog* that's accessible from the radio control program. It's pretty basic, however. It lets you enter a station call sign, RST sent and received, QTH (15 characters max) and a comment (also 15 characters max). The program automatically reads and logs the time and date from your computer, and the operating frequency, mode and power output from the radio. You can create separate log book files for various activities. Each log only holds 500 entries, however, and the software doesn't allow much editing. Kachina says it's working to upgrade *KCLog* and plans to incorporate the *QRZ* call sign database and supply a CD-ROM copy with every radio.

Kachina says that the next version of Personal Database Applications' *LOGic* program is supposed to be compatible with the 505DSP. We are unaware of any way to use DOS-based computerized contest loggers such as *CT* or *TR Log* with the Kachina, however.

On the Air Impressions

Operating SSB with the 505DSP is a pleasure, although you'll probably want to replace the somewhat clunky mobile microphone with something more suitable. The supplied mike will not operate the unit's VOX as wired; Kachina offers an optional VOX-ready desk mike, however. Setting the proper mike gain and speech compression level was pure guesswork until I found "Tailoring the Transmitter's Audio Response" among the *Application Notes* from the Web page. There I learned that the mike gain setting isn't as critical as with most other radios (we did notice that it didn't seem to make much difference how we set this control). The 505DSP has a speech monitor. It uses the filtered, processed, equalized audio just prior to the modulator. Output level is adjusted using the **VOICE/CW SIDETONE** slider. Audio quality was not particularly impressive compared to monitors on other transceivers.

On-the-air comments indicated excellent transmitted audio. With the mike gain set near the top of its range some of my friends on a local 10-meter net noticed some distortion. Likewise with the speech compressor, the audio sounded excellent with low settings and a trace of distortion at

AGC in the Kachina 505DSP

Compared to other HF radios on the market, this one is just, well—*different*. And it's different in a lot of ways that go beyond the immediately obvious. One difference is that the 505DSP actually has two *completely independent* AGC circuits. One of these is a conventional AGC that you'd find in most modern radios. The second is a digitally controlled AGC circuit that serves a different purpose from the first.

As do other rigs on the market with DSP, the Kachina uses analog-to-digital (A/D) conversion at the low IF to prepare the signal for processing by the DSP circuitry. In the 505DSP, the signal level at the input of the A/D converter is controlled by the *digital* AGC in order to make the most use of the converter's resolution.

This dual-AGC added a bit of complexity to the ARRL Lab testing, because the digital AGC is always active, even at the weakest signal levels. To accommodate this AGC action, we had to use a few different test methods.

So what does this mean to you? Not much, really, but 505DSP users may notice a bit of difference in the audio output. With no signals present, the digital AGC increases the gain, so the noise will *sound* somewhat louder than it really is. When a signal comes along—even a very weak signal—the digital AGC backs down the gain, so the noise gets quieter. The overall result is that the sound level from the speaker or headphones that you are using stays about the same after the AGC has settled.

Another difference between this radio and others is the very wide range of AGC time adjustment. The AGC is continuously adjustable at the Current Settings panel from an ultra-fast 0.004 seconds to a torpid 1.049 seconds. Compared to other rigs, the slowest setting will seem like the flowing of molasses on a cold winter day, whereas the fastest setting is nearly instantaneous, so you won't even notice the AGC change taking place.—*Michael Tracy, KC1SX*

high levels. Other users reported similar experiences. The **TX EQ** settings let you pick the audio response that best suits your voice. For "contest" audio, for example, you can click the slider bar to add 12 dB of high-end (treble) emphasis. To add more bass, move the slider the other way.

To fight QRM, you have a choice of filter bandwidths. For SSB operation, these range from very wide—3.5 kHz—to narrower, 2.7, 2.4, 2.1 or 1.7-kHz. For CW operation you can choose any filter from the 3.5-kHz wide sideband filter down to the 100-Hz CW filter. (Other CW filter choices are 1 kHz, 500 Hz and 200 Hz.)

You can also select a CW offset frequency between 300 and 800 Hz in 100-Hz steps. There is no way to select the opposite (reverse) sideband, something many transceivers offer as a means to avoid QRM on one side of the signal. To ease proper CW tuning, pressing the keyboard space bar generates an audio tone whose pitch matches the offset you selected.

Using the internal keyer for CW is easy. Plug in a miniature ($^1/_8$ inch) stereo phone plug wired to your paddle, set the keyer for right or left-handed operation, and adjust the keyer speed. QSK CW worked well and allows you to hear between code elements. The internal keyer range is from 5 to 80 WPM. It would be nice to have a direct digital readout of the keyer speed on the screen instead of having to estimate from the slider bar.

The 505DSP is the first radio ever to let you adjust its CW keying waveform (see Figure 3). The **CW DYNAMICS** slider lets you change from the default keying shape to either a harder or softer keying waveform. The range (256 steps in all) runs from a very slow rise time that sounds quite mushy to a quick rise time that includes a clicky leading-edge spike. You also can adjust weighting. The default positions looked good to us, but you can change the keying shape as needed for use with an amplifier or for special circumstances.

During the ARRL International DX CW Contest, I wanted to use my memory keyer. (The radio control software version at that time allowed only one CW buffer; I wanted the multiple memories of my external keyer.) After wiring the miniature stereo phone plug required for the straight key input, I connected my keyer and hit the "WR1B" button. Out came some of the worst sounding garbage I could imagine! Eventually I figured out that the keyer speed setting somehow limited the speed of the straight key input. Later we learned that this "feature" was included to help you send better CW! The idea is that the keyer's self-completing feature forces you to send better-timed code. Several other reviewers also were also confused by this feature, and the advantage escaped us. The solution? Simply push the internal keyer-speed slider bar all the way to 80 WPM for external keying.

Using *W95SSTV* software with my SoundBlaster card, I spent an enjoyable Saturday afternoon copying SSTV pictures and sending a few of my own. I had wired a cable using the rear-panel DB-25 connector to obtain audio from the receiver, feed audio to the transmitter, and key the PTT line for RTTY. This connection worked perfectly for SSTV.

Also, I spent quite a bit of time trying to operate RTTY with the 505DSP. Initially, I was unable to tune a signal for proper copy using either my KAM communications processor or Brian Beezley's *RITTY* program. Later (with the help of one of the by-now-invaluable "*Application Notes*") I discovered that the last two filter selections—DAT Hi and DAT Med—are data filters. DAT Hi is centered at 2210 Hz, while DAT Med is centered at 1700 Hz. Both have a bandwidth of 500 Hz. As soon as I selected DAT Hi, I had perfect copy on either RTTY system!

On transmit, I ran into another problem. The maximum output from my SoundBlaster using the *RITTY* program was insufficient to drive the transmitter. My KAM also was unable to provide enough signal until I removed a jumper on the main circuit board of the KAM. Kachina has built commercial radios for over 20 years. Apparently in the commercial world, data modems are designed to produce an output signal at 0 dBm into a 600-Ω load. This means you will have to supply a signal with almost 2-V peak-to-peak at the rear-panel DB-25 connector—quite a lot for the typical TNC. In my KAM, this involved changing a jumper. In other cases, you might have to make component or wiring changes.

With the KAM set to high output, I was able to make several RTTY contacts. Other digital modes, such as AMTOR, PACTOR, G-TOR or any of the other modes in use should present no further problems. The radio switches fast enough to handle these handshaking modes.

One seemingly glaring omission on the 505DSP was a noise blanker. However, the radio more than makes up for it with its superb noise reduction function. The noise reduction is "simply amazing," said one user familiar with the performance of several external DSP boxes. The NR can cut static crashes considerably without excessive hollowness due to processing. Whether this stands up to the wide variety of pulse-type noise a radio might be exposed to as well as the typical noise blanker does remains to be seen.

The 505DSP includes a manual and an automatic notch. The automatic notch worked nicely on a single heterodyne in the bandpass, but was ineffective in the presence of more than one. Users gave it poor marks. Since this is a DSP radio, our expectations were much higher. Many, if not most, external DSP boxes offer better performance in this regard. The manual notch was quite effective, however. The manual notch provided attenuation of up to 40 dB (it was frequency dependent). The automatic notch provided a bit less attenuation and took approximately 50 ms to latch up.

Given the lack of crystal filters and almost total reliance on IF DSP in this radio, selectivity was roughly comparable to other radios in this price class. The big difference—and this is a somewhat subjective observation—was the impression that the Kachina 505DSP continues to actively "work" on a signal as conditions change. Enabling noise reduction imparts some "processing" hollowness, too and tends to roll off the treble frequencies. Overall, the receiver's audio was satisfactory, but there's no way to tailor the sound. A digital equalizer might be a nice addition for the future. In the meantime, a little IF shift can work wonders.

Performance Measurements

The ARRL Lab encountered some challenges in testing the Kachina 505DSP (see sidebar, "AGC in the Kachina 505DSP") and some pleasant surprises (see Table 1). The worst-case transmitter IMD measurement shows that the third-order products (see Figure 4) compared favorably with the IMD we've seen recently in similarly priced radios.

We noted exceptionally low composite (phase) noise—approximately 10 dB lower across the 2 to 22 kHz range tested than many radios we have tested recently (See Figure 5). In fact, only the Ten-Tec OMNI IV Plus showed lower composite noise across most of the range. This most likely resulted from the direct digital synthesizer design and the computer temperature-compensated reference oscillator.

Given the absence of crystal filters, we were especially interested the receiver's dynamic range performance. Kachina specs its blocking dynamic range based on a 100 Hz filter setting; the ARRL Lab customarily measures this parameter at a 500 Hz bandwidth. With the 500 Hz filter enabled, our best number was 103 dB on 20 meters. The two-tone third-order IMD dynamic range measurements were slightly better than Kachina's spec and in the ballpark with other radios in this price class. Our preamp-off third-order intercept numbers calculated out to be just a tad lower than Kachina's "typical" +18 dBm.

The 505DSP met the 60 dB spec for spurious and harmonic suppression on some, but not all, bands. The worst case was 53 dB.

Conclusion

The Kachina 505DSP offers solid RF performance on a par with other radios in the $2000 price class. While those who used the radio agreed it might not suit the "power users" out there, it could be a good choice for more casual operators who want to experience the cutting edge of

technology. (Even so, noted DXer and contester Martii Laine, OH2BH, used Kachina 505DSP radios in his hugely successful EA8BH operation from the Canary Islands during the 1997 CQ WW SSB Contest.) The 505DSP also could also be an excellent choice for those who are more at home with a computer and mouse than a transceiver with knobs. In addition, a radio such as the 505DSP opens enormous possibilities for operators with disabilities that make a computer interface more desirable than that of a more traditional radio.

The radio is solidly constructed. In a rather bizarre—and unintended—test of ruggedness, one user accidentally pumped 1500 W of RF directly into the radio's antenna port. While the antenna input selector board was literally smoked and rendered nonfunctioning, the radio still worked otherwise—although a smoke film coated everything! Kachina serviced the radio and had it back to us in short order. We certainly don't recommend this kind of test for any radio, nor would we normally expect the typical transceiver to stand up to this type of abuse!

We would like to thank the following people for their comments and assistance with this review: Dean Straw, N6BV, Ric Plummer, KV1W, Mark Wilson, K1RO, Bart Jahnke, W9JJ, Glenn Swanson, KB1GW, Rick Lindquist, N1RL, and Ed Hare, W1RFI, and Mike Tracy, KC1SX, of the ARRL Lab.

Manufacturer: Kachina Communications, Inc, PO Box 1949, Cottonwood, AZ 86326; tel 520-634-7828; fax 520-634-8053; e-mail **sales@kachina-az.com**; **http://www.kachina-az.com** Manufacturer's suggested retail price: Kachina 505DSP, $1995; model 505-AT internal automatic antenna tuner, $239; 25-foot control cable, $57; 75-foot control cable, $115.

Cherokee AH-50 6-Meter Hand-held Transceiver

Reviewed by Rick Lindquist, N1RL
Senior Assistant Technical Editor

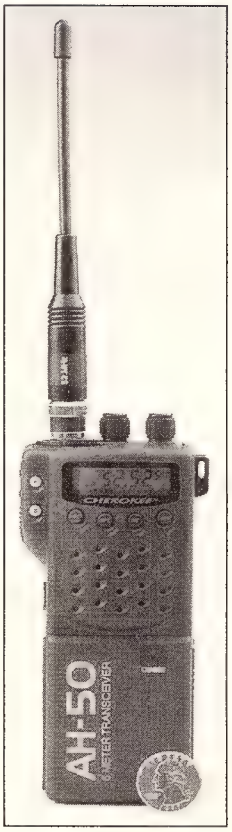
BOTTOM LINE

A solid 5-W performer for 6-meter FM that's easy to use and goes just about anywhere.

Since Azden stopped selling ham gear in the US, you'll have to look long and hard to find much 6-meter FM-only gear. And if you want a single-band H-T for 6-meter FM, the Cherokee AH-50—made in South Korea and distributed in the US by Wireless Marketing Corp—is the only game in town. This is why the company could get away with calling it the "world's smallest" portable 6-meter radio—a moot point now with the

Table 2
Cherokee AH-50 6-meter H-T, serial number 97030430

Manufacturer's Specifications	*Measured in the ARRL Lab*
Frequency coverage: Receive and transmit, 50-54 MHz.	As specified.
Power requirements: 7.2-12 V dc. Receive, ≈35 mA; transmit, (max, high power), ≈900 mA.	As specified.
Size (HWD); 5.1×2.1×1.3 in; weight 14 oz.	
Receiver	*Receiver Dynamic Testing*
FM sensitivity, 12 dB SINAD: 0.3 µV.	For 12 dB SINAD: 0.28 µV.
Two-tone, third-order dynamic range: Not specified.	20 kHz offset, 55 dB; 10 MHz, offset, 91 dB
Adjacent channel rejection: Not specified.	20 kHz offset, 61 dB.
First IF and image rejection: Not specified.	IF rejection, 108 dB; image rejection, 83 dB.
Squelch sensitivity: Not specified.	At threshold, 0.15 µV.
S-meter sensitivity: Not specified.	S9=4.5 µV.
Audio output: 400 mW (distortion and load not specified).	661 mW at 10% THD into 8 Ω.
Transmitter	*Transmitter Dynamic Testing*
Power output (H/L): 5 W / 1.0 W with NP-126, 12.0-V battery pack; with external supply, not specified.	6.2 W / 1.2 W with NP-126 12.0-V battery pack; 6.2 W / 1.2 W at 12.0 V dc.
Spurious signal and harmonic suppression: Not specified.	57 dB. Meets FCC requirements for spectral purity for purity for equipment in its power output class and frequency range.
Transmit-receive turn-around time (PTT release to 50% of full audio output): Not specified.	Squelch off, S9 signal, 190 ms.
Receive-transmit turn-around time ("tx delay"): Not specified.	10 ms.



appearance of the ICOM IC-T8A tribander.

Given the paucity of 50-MHz FM activity in this part of New England, I was a little reluctant to look at the AH-50 in the first place. I anticipated having to drive up into Massachusetts or New Hampshire, where we've found 50-MHz FM activity to be much more prevalent. in order to get some signal reports. Then, I figured I'd be hampered by the unit's 5 W output and rubber ducky antenna—no bigger than the one on most 2-meter H-Ts.

It didn't work out that way, however. Since we last checked out any FM-only gear for "The Magic Band" (see "Product Review," *QST*, Aug 1996), a couple of repeaters have sprung up in the area that provide nice coverage and are attracting new users. The AH-50 was able to bring these up with no problems on its own and provide reliable communication. It's a fun little radio!

No, we had not previously heard of the Cherokee brand, either—at least not before we spotted the AH-50 at a local ham radio retailer's. The company has a line of Citizens Band and Family Radio Service products as well as dc-to-ac power inverters. The AH-50 is the company's first—and only—Amateur Radio product, and it's a solid performer. (We're hoping they'll come out with one of these that operates SSB.)

The AH-50 is an H-T built along pretty traditional "full-sized" lines. Compared to the tiny units now available for the other VHF and UHF bands, the AH-50 is a substantial unit, but it has a comfortable size and feel. This unit can run a full 5 W with the supplied battery (actually, we got a bit more than that out of ours with a fully charged battery). There's a 1 W low-power position, too. A 12-V, 600 mAh NiCd battery powers the AH-50. A wall-cube charger is included, and there's a little **CHARGE** LED on the battery itself.

Atop the AH-50 are two rotary controls, **SQ** squelch and **VOL** (this also has the power switch). There are jacks for **MIC** (microphone) and **SPK** (speaker), too, in case you want to use a speaker-mike. A rubber dust flap covers these jacks when they're not in use. The rubber ducky antenna—just 6½ inches tall and clearly labeled "52 MHz" so you don't get it mixed up with the one for your *other* H-T—attaches to a BNC connector.

Tuning the AH-50 is by ∧ and ∨ buttons on the side of the unit, just above the PTT button. Their location was the only serious complaint I had about this unit—the tuning buttons are too easy to hit by accident when you're going for the PTT button. After using the unit for a while, however, this became much less of a problem. The PTT button has a distinctive feel to it, which you come to recognize. A "real" encoder knob would have been nice, but why quibble?

The face of the unit features an LCD display just large enough to include the necessary information. The readout is nice and bold and easy to read in most lighting conditions and at most viewing angles. The display frame does tend to shadow the top and bottom of the display at some angles, however. The display can show your operating frequency and memory channel (if selected), and tell you if the CTCSS tone, repeater mode (+ or –), 5-kHz tuning step, and low-power modes are enabled. The display also includes a 15-segment LED S-RF indicator. There's a low-battery warning icon. The display also indicates when you're in TX (transmit) mode, when the **F**unction button has been pressed, and if the receiver is busy.

There are six buttons on the front of the AH-50—including a **F**unction button—that provide multiple functions and let you access menus to set things such as CTCSS tone, tuning step, and repeater split. Pressing one of these buttons illuminates the display for nighttime viewing. Other features include a Key Lock mode, Power Save mode, and tone squelch. I enabled the Power Save mode used the unit for several days without ever having to recharge the battery.

The unit has but five memories—not many compared with the dozens available on H-Ts for 2 meters and 70 cm, but probably sufficient to stick in the frequencies of all the 50-MHz repeaters you'd be using on a regular basis. There's a dedicated calling frequency (**CAL**) button—essentially a one-button sixth memory channel—that you can program for the prevailing simplex channel, too. Memories are simple to program, but almost as simple to overwrite. You press the **F** button, then one of the other five front-panel buttons to access a channel you've put into memory. Choice of available repeater splits via the menu is limited to either the common 1-MHz or 500 kHz. As this review went to press, Wireless Marketing announced a new model, AH-50-SF, which permits splits in 100-kHz increments up to 2 MHz.

The unit has limited band and memory-scanning capability. It can scan the entire 50 (yes) to 54 MHz band in approximately 45 seconds and will stop for a few seconds on a busy channel before resuming scanning (unless you stop scanning). It can scan in either direction. In addition, it can scan the memories.

The 23-page *Operating Instructions* booklet is pretty thorough. Wireless Marketing is to be commended for reminding buyers that legal use of the AH-50 requires an Amateur Radio Technician class or higher license. The book also refers users to the American Radio Relay League for more information on licensing. Too bad they made a typo on our "initials" and did not include our address or telephone number. The booklet contains clear graphics and descriptions.

The AH-50 lets you set separate CTCSS tones for transmit and receive (tone squelch). This is not something you're likely to want or need, but our unit must have arrived with a receive tone selected. When I enabled the tone mode to access a local machine that required a CTCSS tone, I was baffled to find I suddenly was unable to hear the repeater, although I could clearly see it "coming back" to me on the **S-RF** meter. I'd read the instructions in the booklet about how to enable the tone mode and set the transmit CTCSS frequency. Obviously, the unit was in tone squelch mode! The retailer didn't know how to disable the tone squelch, so I called Wireless Marketing's toll-free number (800-259-0959). It was a weekend, and no one was there, but I left a message.

Of course, then I decided to take another look at the manual. Aha! After describing how to select the CTCSS tone and going on to talk about scanning is the description of Set Mode, where (among other things) you can set the TX and RX CTCSS tone. I followed these instructions and set the unit for "NO TONE" on receive. Everything worked fine after that. Wireless Marketing called me back Monday morning, however, and seemed very eager to help. I explained that the problem was not in their set but in the operator. The moral of this tale should be pretty obvious.

On-air reports indicated the AH-50 had nice audio, and it was able to hit several area machines with no problem. The area devoted to the speaker "grille" is sizable, and the receive audio was sufficient to fill a small room.

One nice thing about 6 meters is that the band can provide range of the type you don't always find on 2 meters or on 70 cm, so it was not unusual to work stations a couple of states away through a repeater. Enhanced propagation can stretch that distance by hundreds of miles.

The manufacturer's suggested retail price for the AH-50 is pretty steep for a single-band H-T, but we understand the typical street price is *much* more modest. Lots of accessories are available for the AH-50, including a standard battery case that holds 8 AA alkaline or NiCd cells. A drop-in charger is optional, as are a speaker-mike, a carrying case, and a "Super Flex" extended-range antenna that's 28 inches long. You can get a cigarette-lighter adapter cord to run the unit mobile, too.

Manufacturer: Distributed by Wireless Marketing Corp, 1212 Remington Rd, Schaumburg, IL 60173; 800-259-0959; **http://www.wirelessmarketing.com**. Manufacturer's suggested retail price: AH-50 50-MHz FM hand-held transceiver, $400. EX-01 speaker-mike, $33; DC-27 drop-in charger, $110; SA-5 "Super Flex" extended-range 28-inch antenna, $40. QST

Hints & Kinks

Edited by **Bob Schetgen, KU7G** • Senior Assistant Technical Editor

A SIMPLE OUTPUT INDICATOR FOR THE TEN-TEC T-KIT 1208 6-METER TRANSVERTER

◊ Add this handy indicator to your 1208 and know, for sure, when you are transmitting on 6 meters. I heard about the Ten-Tec T-Kit 1208 6-meter transverter from a local ham friend, Orville, W5PGG, who had bought one. He chose a factory-built unit. Another friend, Bob, WØAUS, told me he had worked several 1208s on the air, and they all sounded good. Then, I read the Product Review of the 1208 in the June '96 issue of *QST*.[1] For the very reasonable price of $95 (kit price, factory assembled price is $159), how could I go wrong? I ordered one. When it came, I was surprised at its small size and the number of parts!

I had no problem assembling the kit. Norm's review is excellent, and I agree with his comments about the manual. I paged back and forth often, to view placement drawings and review references to previous construction steps. The manual is my only complaint. I did the progressive testing as instructed by the manual, and at one time—during the receiver testing—heard a station 600 miles away. The transmitting portion of my 1208 was not complete, so all I could do was listen, but it was still great fun to hear my 1208 coming to life! I finished the kit late one night and my first contact was with my friend Jay, WØVNE. We tried every mode we had in common, and everything worked great! I have since made numerous contacts; most are local, but a few reached to the East Coast. All of the signal reports have been good. This kit is the best value I have seen in a long time. I recommend it to anyone who wants to get on 6 meters economically.

Because the 1208 requires only 5 W of drive from an HF rig to develop full output, I was initially concerned about overdriving the transverter with my TS-440 (100 W). Later, I found that I could easily limit the output power of my TS-440 to approximately 5 W by adjusting the **MIKE GAIN** control in SSB operation and the **CARRIER** control in the AM, FM and CW modes. For the first few days—just to get the feel of driving the transverter properly—I used a wattmeter to monitor the 6 meter output power from the 1208. For SSB operation, my tune-up procedure was to set the TS-440 **MIKE GAIN** at its minimum and *slowly* increase the gain as I spoke, watching the HF rig output power meter for an indication of about 5 W. I also watched the wattmeter on the transverter output. I stopped increasing the '440's **MIKE GAIN** when I saw the 6 meter output had reached its maximum. As with any transverter, further increases in drive power do not increase the transverter's output; overdriving the transverter only distorts its signal. These tests confirmed that the power output meter on my HF rig works well enough at low power settings for use with the transverter. When it indicates about 5 W of output power, the 1208 has enough drive to develop full output on 6 meters.

A few days of experience with the 1208 gave me confidence that I could reliably and correctly set the HF output power. I no longer needed the wattmeter attached to the transverter output, but I felt a little uncomfortable without it.

Another issue made me uneasy. The 1208 has a solid-state, RF-sensing TR circuit that controls the voltages to its transmitting and receiving stages. The switching circuit works well in all modes and is very sensitive. If the drive power to the 1208 is too low, however, the transverter does not switch into the transmit mode. (The drive power must be extremely low for this to happen, and it is normally not a problem. I mention this point only because there *is* a minimum drive requirement.) Although it is difficult to produce a drive power level that is too low to switch the 1208 into transmit, my psychology needs an indication that the 1208 is transmitting on 6 meters. I'm not happy without some

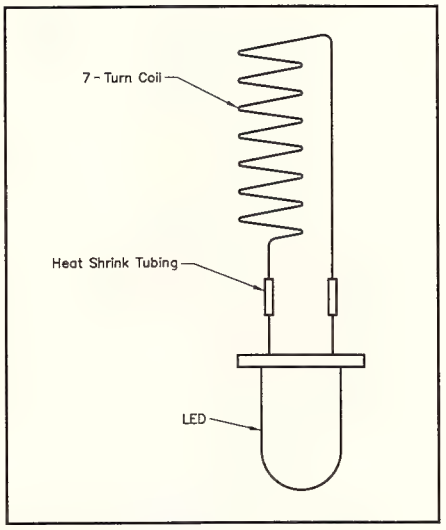


Figure 1—Detail of LED and sense-coil connections.

[1]Norm Bliss, WA1CCQ, "Ten-Tec T-Kit 1208 6-Meter Transverter," *QST*, June, 1996, pp 62 to 64.

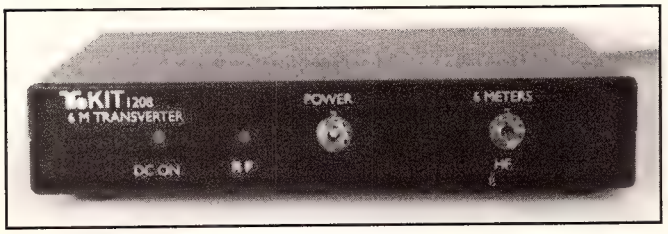


Figure 2—Front panel transverter indicator.

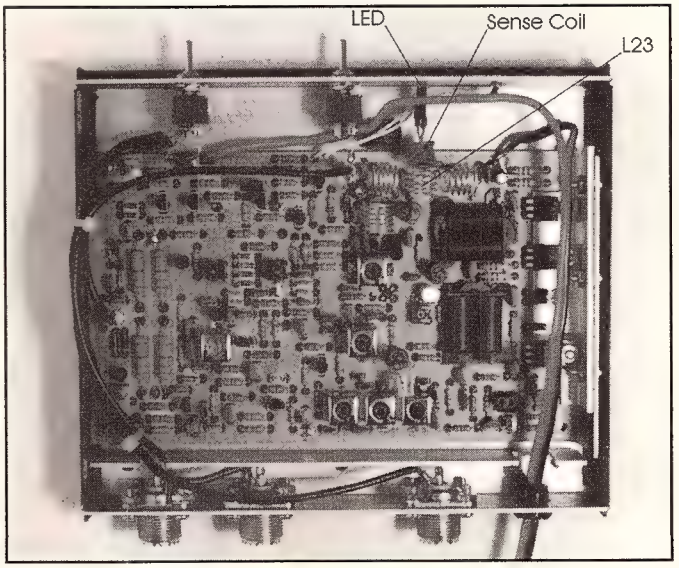


Figure 3—Location of the sense coil.

type of output indicator.

I tried several different output indicators; each has advantages and disadvantages. I settled upon a very simple RF sensing loop and LED, shown in Figure 1. The seven-turn loop is approximately resonant at 50 MHz. The LED acts as a detector and indicator.

Wind the coil around a pencil, use a little heat shrink tubing on each lead for insulation and solder the LED to the coil (polarity does not matter). Drill a hole in the front panel of the 1208 and press the LED into the hole. (I used rub on letters to label the LED **RF**. See Figure 2.

Place the coil near L23 to sense 6 meter power. (I chose L23 because it's close to the LED mounting hole. See Figure 3.) Bend the wires a little to place the sense coil in the correct position, near L23. When the sense coil is too close to L23, the indicator lights to full brightness before the 1208 reaches full output. When the sense coil is too distant, the LED never lights fully. Position the sense coil so that the LED lights almost to full brightness when the 1208 is producing maximum output power.

The new tune-up procedure is similar to what I've described above. I watch the LED for 6 meter output. If the drive to the transverter is too little, the LED will be off or dim. As you increase drive to the transverter, the LED indicator will get brighter until full 6 meter output is attained. Increasing the drive past 5 W will not increase the transverter output, so the LED will get no brighter.

I still watch the wattmeter on my HF rig to make sure I don't overdrive the 1208, and the new little red LED on the 1208 front panel reassures me that I am indeed transmitting on 6 meters.—*Roger Johnson, WAØVLL, 16895 Beverly Dr, Eden Prairie, MN 55347; e-mail* **wilco@minn.net**

MORE ON NEGATIVE BIAS KEYING

◊ I would like to add something to the "Negative Bias Keying" hint in the Oct 1996 column. A useful addition to the circuit is a second diode in series with the output, as shown in Figure 4.

Adding D2 provides three features that improve performance and add desirable capabilities: First, the output voltage is approximately zero, because the junction voltage drops of the two diodes cancel. This makes the output look more like a relay ground connection, 0 V. Some equipment may not tolerate the 0.7 V dc "ground" the original circuit provides. Second, D2 provides reverse-polarity protection in the event that wires to the transmitter are reversed or a failure occurs in the grid-block keying circuitry. Third, multiple circuits can be driven by adding additional diodes (shown as D2 through D*N*). This is useful if you want to mute a receiver at the same time you key the transmitter. The output diodes are "back-to-back" so that the two driven circuits are isolated from each other.

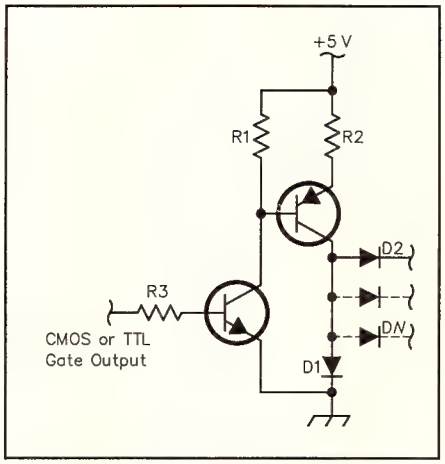


Figure 4—This schematic shows both of K1MC's suggestions. The left-most transistor is the driver transistor of the original keyer circuit. R1 should be between 2 kΩ and 10 kΩ. The value sets the NPN transistor sink current (2.5 mA for 2 kΩ), transistor off-state leakage currents and keeps any parasitic-capacitance time constants below a microsecond. R2 sets the *on* current through the PNP transistor (about 4 V divided by the resistance value; 400 Ω sets the current at 10 mA.) If the grid-block-bias-circuit output current is less than 10 mA, the excess current flows through the diode. The 2N2907A transistor is good for collector currents up to 20 mA, if you need higher currents. R3 should be between 5 kΩ and 15 kΩ. Its resistance should set the NPN base current high enough to ensure that it will saturate without excessively loading the TTL gate output.

The circuit in *QST* uses 1N4003 diodes, which are rated for a minimum reverse breakdown voltage of 200 V. If the circuits being driven have voltages less than 75 V, you can use common 1N4148 diodes. The advantage of the 1N4148 is that the reverse leakage current at room ambient temperatures is only 25 nA (that's *nano*amperes—*Ed.*) compared to the 10 µA for the 1N4003. The lower reverse-leakage currents reduce the loading on the keying circuits.

The output transistor can be a 2N2907A for voltages less than 60 V dc. A 2N4888 will work up to 100 V before breakdown occurs.

The circuit has appeared in *QST* at least three times in keyer articles. I found it in: "The WB4VVF Accu-Keyer," Aug 1973; "The Micro-TO MKII Keyer," Sep 1975; "The Accu-Keyer for QRPp Operation," Jan 1976. It is good that Dave brought the interface back to the current literature.—*Mal Crawford, K1MC, 19 Ellison Rd, Lexington, MA 02173; e-mail* **Malcolm_Crawford@res.raytheon.com**

A letter to K9BO:

◊ David Cornell's (K9BO) circuit in "CMOS Super Keyer III Negative-Bias Keying," in Hints and Kinks for Oct 1996, may be more clever than he realizes. If he removes the diode, the circuit will key both negative and positive lines. My article in Hints and Kinks of April 1993 explains how.

Cornell mentions that he adapted the circuit from a commercial keyer schematic dated 1975. My article refers to earlier appearances of the circuit in *QST*, beginning in 1973. All proposed the circuit only for negative lines; it seems that people who look for negative-line keying circuits don't recognize the extra capability of what they develop. I happened to be looking for a bipolar keying circuit when I came up with it in the mid 1970s. I used the circuit for keying negative lines in several applications before need for a bipolar circuit made me recognize its extra capability. The surprising thing is that no one discovered the bipolar capability by accidentally keying a positive keying line with this circuit!—*Art Boyars, K3KU, 916 North Belgrade Rd, Silver Spring, MD 20902*

K9BO replies:

◊ Thanks to K3KU for his quick and perceptive attention to my Hint and Kinks article on "CMOS Super Keyer III Negative-Bias Keying" in Oct 1996 *QST*. Were I a more thorough researcher, I may have discovered the added possibilities of the circuit.

After thinking it over (without testing my ideas), I have these responses to Art:

- The diode just prevents the bias from rising above 0.7 V (the forward-bias junction voltage for a silicon diode.)
- We can eliminate the diode to key a negative bias circuit, provided that no harm is done if bias approaches 5 V (the dc ceiling of the keying transistor). This should be true for most circuits.
- The diode must be removed to key a positively biased circuit. If present, the diode would cause a constant key-down condition.
- The circuit should key a positively biased circuit, if the transmitter senses a key-down condition when the bias is reduced to about 5 V, the keying transistor emitter-supply voltage. As your letter implies, this may be true for many modern transistorized transmitters.—*Dave Cornell, K9BO, 2 Oakwood Dr, Elsah, Illinois 62028; e-mail* **dcorn@prin.edu**

Hints and Kinks items have not been tested by *QST* or the ARRL unless otherwise stated. Although we can't guarantee that a given hint will work for your situation, we make every effort to screen out harmful information. Send technical questions directly to the hint's author.

QST invites you to share your hints with fellow hams. Send them to "Attn: Hints and Kinks" at ARRL Headquarters (see page 10), or via e-mail to **rschetgen@arrl.org**. Please include your name, call sign, complete mailing address, daytime telephone number and e-mail address on all correspondence. Whether praising or criticizing an item, please send the author(s) a copy of your comments. QST

Technical Correspondence

Edited by ***Paul Pagel, N1FB*** • *Associate Technical Editor*

HUM PROBLEMS WHEN SWITCHING THE K9AY LOOPS

By Gary Breed, K9AY, 2395 Camp Mitchell Rd, Grayson, GA 30017, e-mail **gary@noblepub.com**

I am pleased to report that many hams have successfully built the receiving antenna described in the September 1997 issue of *QST*.[1] I had some concern that variations in local ground conditions and nearby structures could reduce the antenna's performance, but the performance I obtained seems to be readily duplicated.

[1]Gary Breed, K9AY, "The K9AY Terminated Loop—A Compact, Directional Receiving Antenna," *QST*, Sep 1997, pp 43-46.

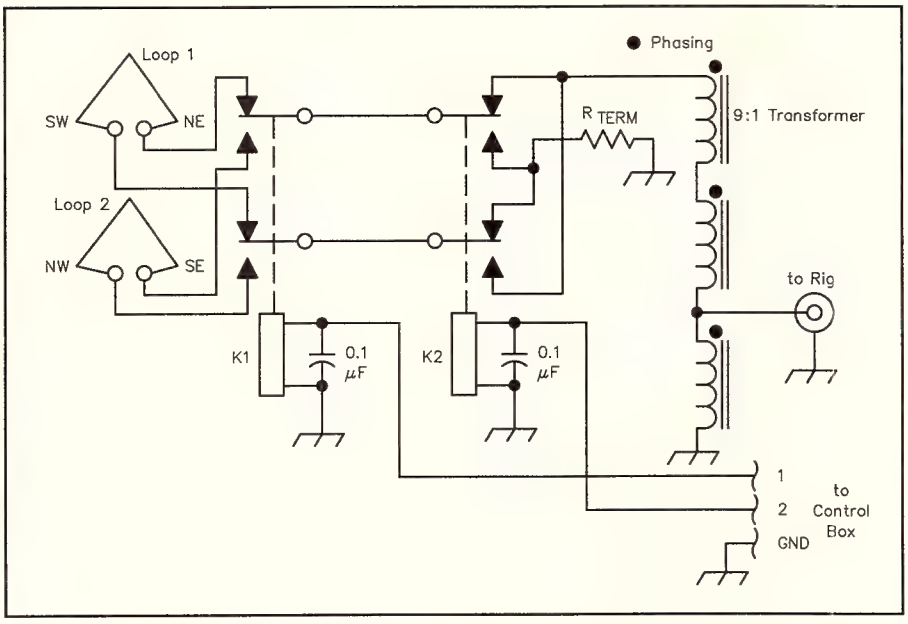


Figure 1—A revision of the schematic shown in Figure 5 of the September 1997 *QST* article.

There is one problem that needs to be addressed. When the loops are switched to the northwest direction, an ac voltage is sent down the coax to the relay box. A few hams have reported hum or distortion when the antenna is switched in this direction. Two explanations are possible: a ground loop due to widely separated antenna and station grounds, or modulation of the core of the matching transformer. The presence of hum was not evident in my prototype, but to avoid either cause of the problem, I recommend using a *separate* three-conductor control wire to operate the relays. The power is solely 12 V dc, and no current flows through the transformer. The modifications are shown in the accompanying figures, which can replace Figures 5 and 6 in the original article.

Secondary benefits of this arrangement include the option of using an existing 12 V power supply to provide the operating voltage, and the ability to use an additional conductor to carry power to an antenna-mounted preamplifier.

Letters for this column may be sent to Technical Correspondence, ARRL, 225 Main St, Newington, CT 06111, or via e-mail to **ppagel@arrl.org.** Please include your name, call sign, complete mailing address, daytime telephone number and e-mail address on all correspondence. Whether praising or criticizing a work, please send the author(s) a copy of your comments. The publishers of *QST* assume no responsibility for statements made herein by correspondents.

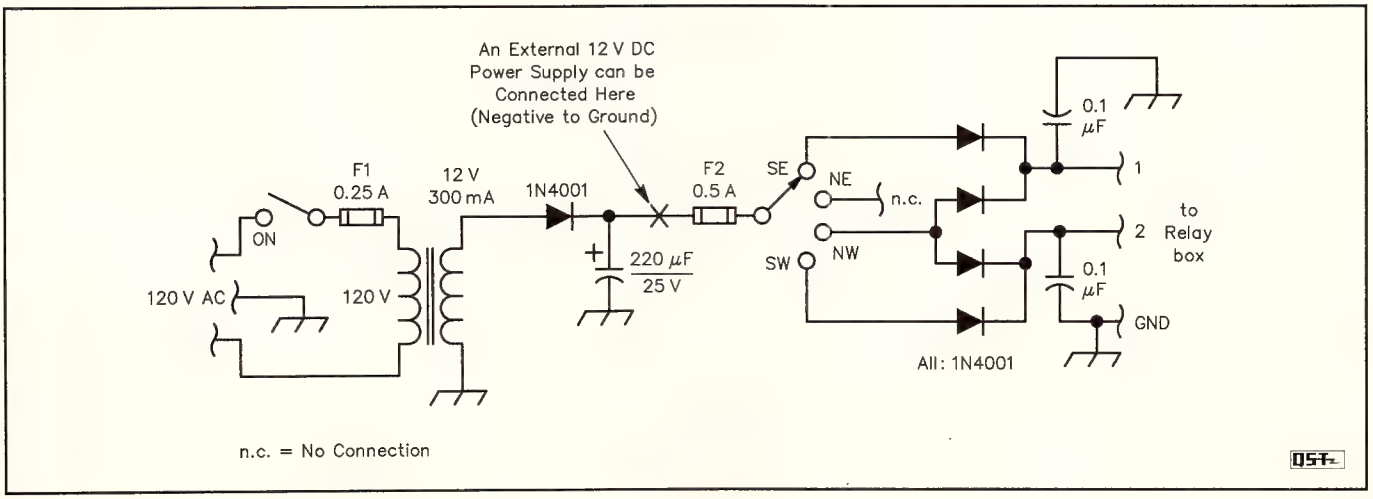


Figure 2—Changes to Figure 6 of the original article.

Edited by **Rick Lindquist, N1RL** • Senior Assistant Technical Editor

Hams Help in Aftermath of Florida Tornadoes

Dozens of hams pitched in to help in the aftermath of intense storms and tornadoes in Central Florida that killed more than three dozen and injured hundreds of others. The tornadoes and heavy thunderstorms struck early on February 23—a Monday—while most people were asleep, surprising the residents of the affected areas between Daytona Beach and Orlando. Many were left homeless by the storms, now being called the deadliest and most destructive in Florida's recorded history.

Weather observers blamed the tornadoes on the El Niño weather pattern. Some families lost their homes and everything they owned.

Central Florida hams had activated a SKYWARN net on the advice of the National Weather Service in anticipation of severe storms. Storm-spotting hams stayed on duty during the evening of February 22—when the first tornado was reported in Volusia County—and into the early morning hours of February 23. At one point, SKYWARN newcomer Paul Catineau, KF4UTN, announced to the net, "The sky is boiling!" Net participant Randy Johnson, N4TYV, says he grabbed his H-T and dove for cover when he heard the classic "freight train" sound of a tornado passing through Winter Garden. His QTH was spared.

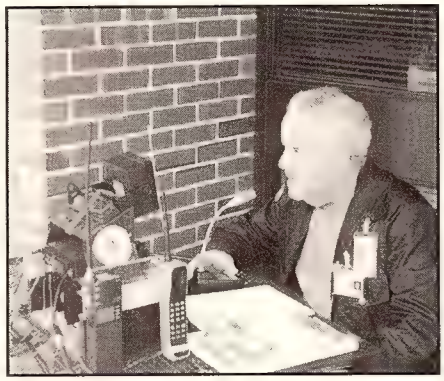
In a letter of thanks to East Central Florida SKYWARN ops, Scott Spratt, KT4PD, of the National Weather Service Office in Melbourne called the SKYWARN reports "extremely beneficial" and said the ham radio weather spotting "undoubtedly helped to save lives."

Osceola County—the only county in the Southern Florida section affected by the storms—was hardest hit. Osceola County EC Christopher Hammock, KE4DUJ, spent several days at the county Emergency Operations Center after first going door to door to determine who needed help or rescue. An Auxiliary Communication Service net—activated to supplement communication for the county's Office of Emergency Management—dispatched equipment and personnel to shelters as they opened. A VHF system was used to pass traffic from the shelters to emergency management and Red Cross officials. Osceola has a small ham population. Southern Florida SM "Rip" Van Winkle, AA4HT, says the county had help from hams in Polk and Brevard counties.

Osceola County Emergency Management Coordinator Steve Proctor praised the hams' participation and assistance. "We had a great response," said Proctor, who estimated that as many as 30 hams were directly involved in providing disaster communication and in damage assessment activities. "Emergency Management was certainly grateful for the assistance." Proctor said he hopes to have his own ham ticket soon.

Emergency Coordinators Bernie Farthing, NP2CB, in Orange County, Dick Fess, K4FUY, in Seminole County, and Bill Crandall, KM4AE, in Volusia County activated their EOC positions and ARES and RACES teams early on February 23.

MIKE WELCH, KF4HFC



ARES member Norm Lauterette, WA4HYJ, provides communication at an emergency shelter in Seminole County, Florida.

The Red Cross was among the first agencies requesting amateur support. Dozens of hams were stationed at EOCs and shelters or put to work providing damage assessment, communication support, or backup communication to relieve already-congested commercial systems. Seminole County ARES/RACES member Allen Wilson, WB7BCI, was among dog-handler hams activated to assist in the search and rescue effort.

Army and Air Force MARS stations also assisted during the storm assessment and recovery. Army MARS Public Relations Coordinator Lorraine Matthew, N4ZCF/AAA9PR, said MARS stations supplied essential information reports to Army MARS management and the Directorate of Military Support. These reports are shared with federal agencies that might be called in to assist. Using existing nets, Army MARS stations remained on the air around the clock in the storm's aftermath.

Just a couple of weeks after the tornadoes devastated Central Florida, hams in Northern Florida responded when heavy rain and strong winds resulted in flooding after many rivers and creeks overflowed their banks. The flooding forced some evacuations. In Florida's West Panhandle, ARES personnel manned the Walton County EOC and Red Cross shelters in Walton and Holmes counties. ARRL

MIKE WELCH, KF4HFC

WA4HYJ visits a mother and her young daughter inside their storm-ravaged home during a damage assessment tour in Seminole County, Florida.

Northern Florida Section Emergency Coordinator Nils Millergren, WA4NDA, was among those keeping an eye on river and stream levels and filing regular situation reports with the Florida State EOC. Flooding also occurred further north in Georgia. Dougherty County EC Arthur Shipley, N4GPJ, estimated that as many as 50 hams there were directly involved in emergency response, flood relief, damage assessment, and recovery efforts.—*thanks to Nils Millergren, WA4NDA, "Rip" Van Winkle, AA4HT; Steve Proctor, Lorraine Matthew, N4ZCF, Mike Welch, KF4HFC, Norm Lauterette, WA4HYJ, Dave Flagg, N4BGH, and Arthur Shipley, N4GPJ*

HAM RADIO TO BE ABOARD WHEN JOHN GLENN RETURNS TO SPACE

A ham radio package will be aboard the shuttle flight that carries US Senator and astronaut John Glenn into space this fall. Word from NASA is that the Shuttle Amateur Radio EXperiment or SAREX payload will be carried on shuttle mission STS-95 when it flies in October. The shuttle will carry the 77-year-old space pioneer into orbit for the first time since the early 1960s, when he became the first US astronaut to orbit the Earth.

Two hams—US astronaut Scott Parazynski, KC5RSY, and European Space Agency astronaut Pedro Duque, KC5RGG, of Spain—will be among an international crew aboard STS-95. The launch date for the only other SAREX mission scheduled for 1998—STS-93—has slipped from August to December. Glenn already has begun his astronaut training, but it's not yet known if he plans to get his ham ticket before he returns to space.

MORE *MIR*-SCHOOL CONTACTS

The long, dry spell for schools waiting for a chance to have their students talk via ham radio with *Mir* finally broke in late February and has turned into a continuing trickle of *Mir*-school QSOs. Amateur Radio contacts between the Russian space station and schools had been on hold since a series of problems plagued *Mir* last year. Aboard *Mir*, US astronaut Andy Thomas, KD5CHF, spoke with youngsters at schools in California, Colorado, South Carolina, and Wyoming in late February and early March.

Some of the schools on the schedule originally had been scheduled to talk with US astronaut Jerry Linenger, KC5HBR, who was aboard *Mir* in early 1997. Arranging the most recent QSO schedule took several months and was complicated by last year's equipment malfunctions aboard *Mir* and—more recently—by the crew changes.

On February 23, Thomas spoke with enthusiastic youngsters at Shell Beach Elementary School in Pismo Beach, California. The following day, ten equally excited kids at Prairie Hills Elementary School in Colorado Springs, Colorado, got their chance to speak with Thomas via WAØVTU, the club station of the Pikes Peak Radio Amateur Association. An audience of around 350—including reporters—looked on and listened in.

On February 26, pupils at Buist Academy in Charleston, South Carolina, fired off a dozen questions. Thomas—using his Australian-issued VK5MIR call sign for the telebridge contact via VK5AGR—managed to answer 11 of them during the 10-minute contact. In one answer, Thomas spoke of the importance for those in space to have radio contact with Earth to keep in touch with friends and family.

On March 10, Thomas—using the RØMIR call sign—answered a dozen questions from the students at Carey Junior High School in Cheyenne, Wyoming, as another 60 or so fellow students, teachers, parents, and news media looked on and listened in. During the very solid contact via a telebridge connection with W5RRR at Johnson Space Center, Thomas told the students that sleeping in *Mir*'s weightless environment was quite comfortable and that he had no problems falling asleep. Thomas also said he has books, CDs, tapes, computer games, and videos for entertainment aboard *Mir*. "There's even a guitar up here which I've attempted to play a couple of times—without a whole lot of success, I'm afraid," he said.

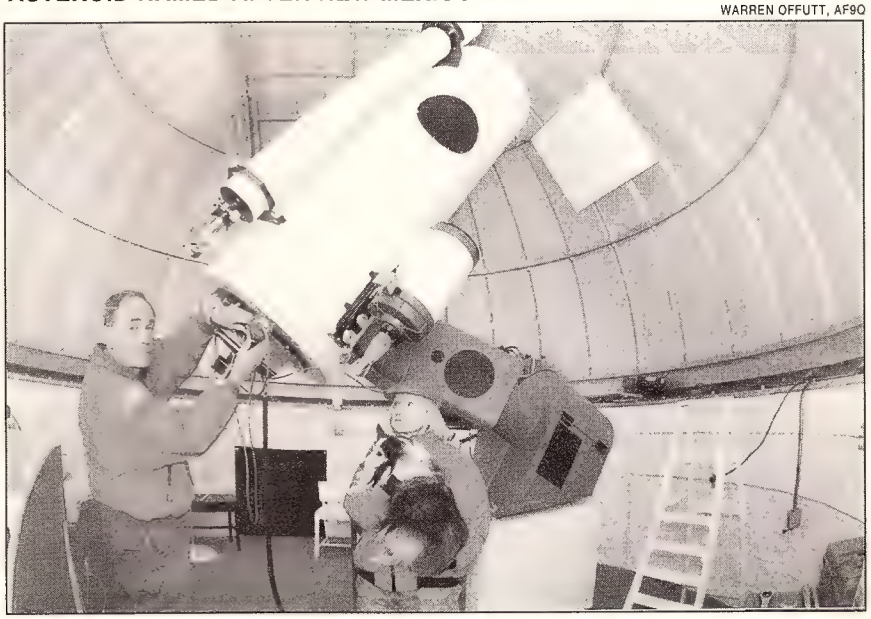
The honor of asking the first question went to 17-year-old Beth Harris, KJ7FC, the 1995 winner of the Hiram Percy Maxim Award (see *QST* Feb 1996, p 87). Harris, a Carey JHS alumna, now is a student at Cheyenne East High School. Carey Junior High School has a very active Amateur Radio program and has a club station, KC7OEK.

Other *Mir*-school contacts were scheduled through mid-April with schools in Florida, New Mexico, Connecticut, Delaware, New Jersey, and Massachusetts. All contacts were carried out on 70 cm.

AMSAT Vice President for Manned Space Programs Frank Bauer, KA3HDO, said he was pleased that the school contacts logjam was finally starting to clear. "It was exciting to hear the students' reactions to the contacts and rewarding to know that we have provided an experience to these communities they will never forget," he said.

ASTEROID NAMED AFTER NEW MEXICO HAM

WARREN OFFUTT, AF9Q



In addition to his interest in ham radio, Warren Offutt, AF9Q (left, above) of Cloudcroft, New Mexico, has a deep interest in astronomy and gained considerable renown as an amateur stargazer. Now, his name is up in lights—in a manner of speaking—in the form of an asteroid some 350-million miles from Earth. After retiring from an engineering career, Offutt and his wife, Beverly, N9JVN (right, above), moved from Illinois and set up a research observatory in the Sacramento Mountains of south-central New Mexico.

Offutt says he learned just a few days before his 70th birthday (on February 13, 1998) that the International Astronomical Union was naming Minor Planet (7639) in honor of his scientific contributions. The asteroid now will be known formally as Minor Planet (7639) Offutt. Estimated to be several miles in diameter, it orbits the sun in the asteroid belt between Mars and Jupiter.

"I've thought about setting up a repeater on (7639) Offutt, but the technical challenges seem formidable," Offutt joked.

Bestowing the honor of naming the asteroid in Offutt's honor was the IAU's Brian Marsden, who first spotted the asteroid in 1985 at Harvard. Over the past year, Offutt has helped in three major discoveries from his home observatory. An ARRL member and licensed in 1943, Offatt says his 55 years of hamming "have been a wonderful experience. I still get a thrill out of each new contact." He and his wife have ten children. Three of them, plus one son-in-law, also are hams.

Thomas, a 46-year-old Australian native, will work aboard *Mir* until June.

FCC PROPOSES RULES CHANGES AFFECTING HAMS

In a sweeping Notice of Proposed Rulemaking the FCC has suggested several rules changes that could affect Amateur Radio, including replacement of the venerable FCC Form 610. NPRM Docket WT 98-20, "To Facilitate the Development and Use of the Universal Licensing System in the Wireless Telecommunications Services," sought comments on proposals to replace Form 610 with FCC Form 605; to permit automatic reciprocal licensing of foreign hams wishing to operate in the US; to privatize the issuance of club station licenses; and to require applicants and licensees to supply a taxpayer identification number (TIN) and to file electronically. The FCC also plans to consolidate the application procedures for all Wireless Telecommunications Services into a single set of rules. All of these proposals are part of the FCC's efforts to implement the Wireless Telecommunications Bureau's Universal Licensing System (ULS).

The new Form 605 would apply for Amateur Radio and other services "not presently required to submit extensive technical data to receive a license." The Wireless Telecommunications Bureau is trying to drastically cut down the number of forms for the various services it administers, and to include all of its services under the ULS. The FCC last November began initial collection of licensee data to populate the ULS. Using the ULS, applicants and licensees will be able to file, modify, and renew electronically. Ultimately, the FCC intends to require all applicants, as appropriate, to file all applications and notifications electronically.

The FCC says it's tentatively concluded that there is "little or no need to continue issuing the reciprocal permit" (FCC Form 610-AL) for alien amateur licensees because the license from any foreign country with which the US has a reciprocal agreement would "stand as the proof that the foreign operator is qualified for the reciprocal operating authority." Reciprocal operation under the new regime would be "by rule," which means no special action is necessary on the applicant's part, and the elimination of Form 610-A.

For club station licenses, the FCC proposes to accept the services of VEC-like organizations as volunteer club station call sign administrators. Prospective organizations would have to complete a pilot autogrant batch filing project before being authorized as call sign administrators.

Under the ULS, applicants or licensees would have to supply a TIN, usually a Social Security number, or "its functional equivalent." The FCC says this is "consistent with the requirements of the Debt Collection Improvement Act of 1996." To allay fears of misuse of TINs, the FCC says the ULS would be designed so that TINs will not be available to the public and "only a small number of Commission employees would have access to TIN information in conjunction with their work." The FCC says a Privacy Act submission would be published in the *Federal Register* "to obtain the requisite public and Congressional comment and Office of Management and Budget approval prior to implementation of the ULS."

A text version of the entire rulemaking proposal is at **http://www.fcc.gov/Bureaus/Wireless/Notices/1998/fcc98025.txt**. The ARRL planned to file comments on the proposal, released March 20. Comments on WT Docket 98-20 were due to the FCC 30 days after publication in the *Federal Register*. The FCC said it would not accept e-mail comments.

GREAT LAKES DIRECTOR RESIGNS

ARRL Great Lakes Division Director Joe Falcone, N8TI, unexpectedly resigned, effective March 23. He offered no reason

IRIS COLVIN, W6QL, SK

GORDON GIRTON, W6NW

The Colvins—Floyd, W6KG, and Iris, W6QL—in 1988.

The other half of the world-famous Colvin DXpedition team, Iris Colvin, W6QL, of Richmond, California, died February 18 at her home. She was 83. Iris Colvin was first licensed in 1945. She and her late husband, Lloyd Colvin, W6KG, traveled the world between the 1960s and the early 1990s, operating from more than 100 DXCC countries. Lloyd Colvin died in 1993. The couple had been married for 55 years.

The Colvins racked up more than a million contacts over the years and amassed one of the largest QSL collections in the world—more than a half million cards at last count. The collection is said to have occupied an entire room in the Colvins' home.

The ARRL Board of Directors recognized the Colvins' contributions to international goodwill by naming them Amateur Radio Ambassadors of the Decade 1980-1990. The Colvin Award was established in 1994 from the proceeds of an endowment set up by Lloyd Colvin that named the ARRL as a beneficiary. The Award disburses grants to support ham radio projects that promote international goodwill in the field of DX. Among others, the Colvin Award has helped to fund the second World Radiosport Team Championship in 1996 and the VKØIR Heard Island DXpedition in 1997.

Upon learning of Iris Colvin's passing, Carlos Garnier da Silva, PY1HDG, commented, "The DX world owes a debt to the Colvins. I had a lot of fun working them, and I will never forget their efforts on behalf of ham radio." Rusty Epps, W6OAT, said, "With her passing, we have lost both a friend and one of the true giants of Amateur Radio."

Iris Colvin was a Charter Life Member of the ARRL and a life member and past president of the Northern California DX Club. She also was on the DXCC Honor Roll and was inducted into the CQ DX Hall of Fame in 1976.

A daughter and grandchildren survive. Services were private.

BASIL O'BRIEN, G2AMV, SK

Former RSGB President Basil O'Brien, G2AMV, died on February 21. O'Brien represented the North of England as an RSGB Council Member for many years and had previously been Regional Representative for the North-West. O'Brien was RSGB President during 1981. Eight years later, he was awarded the highest honor to be bestowed by the RSGB—he was made a Vice President. Services were February 27. US amateurs had the opportunity to meet Basil O'Brien and his wife, Eileen, G3IWO, at the 1981 ARRL National Convention in Orlando and at the 1982 Dayton Hamvention.—*RSGB; David Sumner, K1ZZ*

JAMES McCAULEY SR, AB6EU, SK

San Francisco Section Traffic Manager Jim McCauley, AB6EU, of Glen Ellen, California, died March 10. He was a dedicated CW traffic handler in the National Traffic System and had served as STM for six years. McCauley also was an active Volunteer Examiner, instructor, Elmer to new hams, and a past recipient of the ARRL Herb S. Brier Instructor of the Year Award. He was a member of the ARRL and of the Valley of the Moon Amateur Radio Club. His wife, Betty, survives.—*John Wallack, W6TLK*

for his decision to step down.

An attorney from Livonia, Michigan, Falcone became a director January 1, 1998, after defeating incumbent Director George Race, WB8BGY, in balloting last November. Falcone was a member of the ARRL's Enforcement Task Force.

Great Lakes Vice Director Dave Coons, WT8W, automatically succeeded to the office of Director, creating a vacancy in the Vice Director's position.

NEW SECTION MANAGERS

Virginia, Pacific, and San Diego got new section managers April 1, while incumbent section managers were returned to office in five other sections.

In the Virginia Section, Lynn Gahagan, AF4CD, of Chesapeake outpolled Lawrence Macionski, W8LM, of Bluemont 1256 to 579. Gahagan succeeded Chris Wright, KD4TZN.

In the Eastern Pennsylvania Section, incumbent SM Allen Breiner, W3TI, of Tamaqua defeated Robert Stanhope, KB3YS, of York 950 to 760.

In the North Carolina Section, incumbent W. Reed Whitten, AB4W, of Cary was the winner in a three-way race. Whitten received 730 votes. Challengers Glenn Roger Allen, KD4MYE, of Wake Forest and Billy Mitchell, WB4SGA, of Mebane, polled 657 and 636 votes respectively.

Votes from the three contested sections were counted February 24 at ARRL Headquarters.

In other races, candidates in five other sections were uncontested. Also declared elected and taking office April 1 were: In the Eastern New York Section, incumbent Rob Leiden, KR2L, of Scotia; in the Louisiana Section, incumbent Lionel "Al" Oubre, K5DPG, of New Iberia; in the Pacific Section, Ronald Phillips, AH6HN, of Keaau, Hawaii (Phillips succeeds Dean Manley, KH6B); in the San Diego Section, Tuck Miller, K6ZEC, of National City (Miller succeeds Patrick Bunsold, WA6MHZ); and in the South Dakota Section, incumbent Roland Cory, WØYMB, of Mobridge.

Four ARRL sections will have new section managers beginning July 1, 1998. In Alaska, David Stevens, KL7EB, of Anchorage, will replace Russell Ely, WL7LP; in Maine, William Woodhead, N1KAT, of Auburn, will replace Michelle Mann, W1GU; in Oregon, William Sawders, K7ZM, of Bend will succeed Randy Stimson, KZ7T; and in Santa Clara Valley, Geoffrey Ellis, KD6MFM, of Santa Cruz will succeed Kit Blanke, WA6PWW. In all four sections, the incumbents declined to run for another term, and the successful candidates ran unopposed.

In seven other ARRL sections, incumbents ran unopposed for re-election. They include Scott Johnson, N4YYQ, in Alabama; Bruce Boston, KD9UL, in Illinois; Peggy Coulter, W9JUJ, in Indiana; Orlan Cook, WØOYH, in Kansas; Rudy Hubbard, WA4PUP, in Northern Florida; Bernie Capron, N1NDN, in Vermont; and Roy

In Brief

• **Texas hams aid Red Cross after evacuation:** Hams in Bexar County, Texas, scrambled to support the American Red Cross after the 1400 residents of Natalia, Texas, had to be evacuated in the wake of a fire February 19 at a foam manufacturing plant there. Bexar County EC Neil Martin, WA5FSR, reports The Red Cross requested ARES to activate a communications support net to link the Red Cross chapter in San Antonio with Devine, where shelters were available for the evacuees. An emergency net continued in operation for the next 24 hours. Comal County EC Todd Covington, N5IJR, and Rick Trevino, N5HJP, provided on-scene support in Natalia from an emergency communication van. In all, some three dozen hams took part in the emergency effort.—*thanks to Ray Taylor, N5NAV*

• **Hail and farewell!** Educational Activities Coordinator Glenn Swanson, KB1GW, has resigned from the HQ staff to take a position as a technology support specialist for the West Hartford, Connecticut, public schools. He had worked at HQ in various capacities since 1993 and was a frequent contributor to *QST*. Our best wishes to Glenn in his new job. Replacing him in Educational Activities is Jean Wolfgang, WB3IOS. She is the wife and mother, respectively, of HQ staffers Larry Wolfgang, WR1B, and Dan Wolfgang.

• **Hams retire from astronaut corps:** Jerry Linenger, KC5HBR, who lived aboard the *Mir* space station for 122 days, has retired from NASA to pursue private interests. Linenger was aboard the Russian space station from January to May 1997, during the time when a fire broke out aboard the spacecraft. Also retiring as a NASA astronaut was shuttle veteran Blaine L. Hammond, KC5HBS, who flew on two shuttle flights.

• **FCC computer system breaks down:** The FCC's Amateur Radio computer system went down February 10, and no paper or electronic applications were processed for nearly 11 days as FCC personnel in Gettysburg attempted to troubleshoot the problem. The FCC got the errant computer system back on line February 21 and soon processed the application backlog. The FCC offered no explanation for the computer breakdown—its longest ever—but did apologize to VECs for the inconvenience.

• **New ARRL Book—*RF Exposure And You*—available:** If you're worried about how to comply with the FCC's new RF exposure requirements, you'll want a copy of *RF Exposure and You* by ARRL Lab Supervisor Ed Hare, W1RFI. As ARRL Executive Vice President Dave Sumner, K1ZZ, put it: "The new RF exposure rules are now a part of the regulatory landscape and are likely to remain so. *RF Exposure and You* is the best way available to ease the transition." This book communicates one simple message: For the vast majority of Amateur Radio operators, the RF exposure rules are *not* difficult to understand and follow. Visit your local Amateur Radio retailer or the ARRLWeb, **http://www.arrl.org/catalog/6621**, or call toll-free 888-277-5289. *RF Exposure and You* is $15 (plus shipping and handling). Order Item #6621.

• **ARRL updates "Learn About Amateur Radio" page:** The ARRL Educational Activities Department has unveiled a newly updated "Learn About Amateur Radio" page on the ARRLWeb at **http://www.arrl.org/hamradio.html**. In addition to several color photos, the overhauled site has added sound, and encourages visitors to learn more about the hobby. The page—still a bit of a work in progress—includes the sounds of a SAREX contact between space shuttle astronauts and schoolchildren on Earth, a CW transmission, and hams talking on an FM repeater. Other sounds are in the works and will be added in the near future. In addition to a sound card in your PC, you'll need *RealPlayer* 5.0, downloadable free of charge from RealAudio, **http://www.real.com/**. Clubs, school groups, or individuals demonstrating Amateur Radio might consider using this page as a starting point for their presentations.

• **YHOTY nominations open:** Nominations are open for the *Amateur Radio Newsline* 1998 Young Ham of the Year (YHOTY). The YHOTY award goes each year to a US amateur 18 or younger who has used Amateur Radio to significantly contribute to the benefit of the hobby, to the state of the communications art, to the community or to the nation. Nominations are due by June 30, 1998, on an official application. To obtain an application, send an SASE to 1998 Young Ham of the Year Award, *Newsline*, 28197 Robin Ave, Saugus CA 91350. Nomination applications also are available at **http://www.arnewsline.org**. The award presentation will take place at the Huntsville Hamfest in August.—*Bill Pasternak, WA6ITF*

• **KC5YNE honored:** Arkansas 4-H President Marc Harrison, KC5YNE, is one of 12 people selected to join the 1998 National 4-H Technology Corps. Corps members receive two days of intensive training and provide tech support to the 4-H National Conference by serving as e-mail group managers, webmasters and instructors. Harrison, 18, underwent training in March in Washington, DC. He's the son of ARRL Vice President Joel Harrison, W5ZN. His picture appeared in *QST* Nov 1997, p 19. For more information about the Technology Corps, see **http://www.4-h.org/4htech**; e-mail **4htech@extension.umn.edu**.

Pedersen, K9FHI, in Wisconsin.

In Mississippi, Malcolm Keown, W5XX, of Vicksburg, was appointed as Section Manager to replace Ernest Orman, W5OXA, who stepped down.

ANDY FELDMAN, WB2FXN, IS DAYTON'S HAM OF THE YEAR

"Excited, still numb, shocked," were the words Andrew J. "Andy" Feldman, WB2FXN, used to describe his reaction to being named Dayton Hamvention's 1998 Amateur of the Year. Feldman, who's being recognized for his lifelong dedication to public service through his ARES and RACES activities, has been active in public service since being licensed in 1962. He's served as Suffolk County (NY) ARES District Emergency Coordinator and as Suffolk County's American Red Cross chapter disaster communications chairman. Recently, he became Director of Communications for the New York Wing, Civil Air Patrol. He's also active in SKYWARN. Feldman was in the forefront of ham radio support activity following the TWA Flight 800 disaster in July 1996, and during an outbreak of fires on Long Island in the summer of 1995.

The Technical Excellence Award winner is Bob Bruninga, WB4APR, the "father of APRS." Bruninga, who's being honored for creating and developing the Automatic Packet Reporting System in 1992, said he was surprised to learn he'd been named a winner. He said he views the award as a tribute to the thousands of APRS users. "APRS wouldn't be anything without them," he said.

The Special Achievement Award goes to ARRL Dakota Division Vice Director John B. "Jay" Bellows Jr, KØQB. Bellows, of St Paul, Minnesota, is being honored for his work promoting the limited federal preemption, PRB-1, which requires municipalities to reasonably accommodate Amateur Radio antenna requirements. Bellows gained exposure through his *pro bono* legal work in the Pentel v Mendota Heights, Minnesota, case, which reaffirmed the original intent of PRB-1 (see *QST* Mar 1994, p 91).

All three awards will be presented at the Dayton Hamvention banquet May 16. Country music legend Ronnie Milsap, WB4KCG, will be the banquet speaker as well as the evening's entertainment.

KENNAMER TAPPED AS MEMBERSHIP SERVICES MANAGER

ARRL DXCC Manager Bill Kennamer, K5FUV, replaces Chuck Hutchinson, K8CH, as Membership Services Manager at ARRL Headquarters, effective April 20. Hutchinson is stepping down and into a part-time role for medical reasons.

Hutchinson took over the Membership Services Department in January 1991 after more than nine years in the Technical Department—six of them as department manager. As Membership Services Manager, he completed the computerization of DXCC records—with more than six million contacts now in the database—and improved DXCC service. Among his other accomplishments, he increased the use of computers to improve service and boost productivity, expanded W1AW's mission to improve bulletin dissemination, rejuvenated the A-1 Operator's Club, and made it easier for overseas amateurs to receive IARU Worked All Continents and DXCC certificates.

Kennamer is a 1968 graduate of the University of Arkansas. He joined the HQ staff in June 1992 after a career in the insurance and securities industries and as manager of AGL Electronics in Dallas. He has extensive contesting and QSL Bureau experience in addition to DX.

ARRL Executive Vice President David Sumner, K1ZZ, expressed his regrets at Hutchinson's departure as MSD manager. "I will miss Chuck's valuable assistance and counsel in that role," he said. "I am pleased that he will be able to continue serving the League in a part-time, technical editorial position."

FCC SEQUENTIAL CALL SIGN UPDATE

The following is a list of FCC sequentially assigned call signs issued as of March 3, 1998.

District	*Group A Extra*	*Group B Advanced*	*Group C Tech/Gen*	*Group D Novice*
Ø	ABØHH	KIØLX	++	KCØCVG
1	AA1TI	KE1JH	++	KB1CLA
2	AB2EZ	KG2NS	++	KC2DBT
3	AA3QV	KF3AZ	++	KB3CEJ
4	AF4IN	KU4PG	++	KF4VZK
5	AC5PB	KM5PI	++	KD5DLN
6	AD6EP	KQ6UU	++	KF6PQR
7	AB7XM	KK7MK	++	KD7ATP
8	AB8BZ	KI8FE	++	KC8JJU
9	AA9VN	KG9MS	++	KB9SFL
N Mariana Is	NHØC	AHØAY	KHØGV	WHØABI
Guam	++	AH2DF	KH2TG	WH2ANV
Hawaii	NH7G	AH6PF	KH7IQ	WH6DEN
American Samoa	AH8P	AH8AH	KH8DL	WH8ABF
Alaska	ALØJ	AL7RA	KLØNM	WL7CUR
Virgin Islands	++	KP2CN	NP2JZ	WP2AIJ
Puerto Rico	NP3T	KP3BE	NP3UK	WP4NNQ

++All call signs in this group have been issued in this district.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Connecticut, Idaho, Minnesota, North Dakota, Ohio, Oklahoma, Southern Florida, Western New York, Puerto Rico, and Virgin Islands sections. You are hereby solicited for nominating petitions pursuant to an election for section manager (SM). Incumbents are listed on page 12 of this issue.

To be valid, a petition must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are *not* acceptable. No petition is valid without at least five signatures, and it is advisable to have a few more than five signatures on each petition. Petition forms (FSD-129) are available on request from ARRL Headquarters but are not required. We suggest the following format:

(Place and Date)

Field Services Manager, ARRL
225 Main St
Newington, CT 06111

We, the undersigned full members of the _____ ARRL section of the _____ division, hereby nominate _____ as candidate for Section Manager for this section for the next two-year term of office.

(Signature___Call Sign___City___ZIP___)

Any candidate for the office of Section Manager must be a resident of the section, a licensed amateur of Technician class or higher and a full member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination. Petitions must be received at Headquarters by 4 PM Eastern Time on June 5, 1998. Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before July 1, 1998, to full members of record as of June 5, 1998, which is the closing date for nominations. Returns will be counted August 18, 1998. Section managers elected as a result of the above procedure will take office October 1, 1998.

If only one valid petition is received from a section, that nominee shall be declared elected without opposition for a two-year term beginning October 1, 1998. If *no* petitions are received from a section by the specified closing date, such section will be resolicited in the October 1998 *QST*. A section manager elected through the resolicitation will serve a term of 18 months. Vacancies in any section manager's office between elections are filled by the Field Services Manager. You are urged to take the initiative and file a nomination petition immediately.—*Richard K. Palm, K1CE, Field Services Manager*

How's DX?

Edited by **Bill Kennamer, K5FUV** • DXCC Manager

DXCC 2000: New Rules for the New Century—*Part 2*

By Bill Kennamer, K5FUV, and Chuck Hutchinson, K8CH

Last month we gave an overview of the new DXCC List criteria. While this is the basis for the DXCC program, there were other refinements in the existing rules as well.

Station Locations

Since its inception, the DXCC program has required that all claimed contacts be made with land-based stations. Without changing the intent of this rule, an exception is now made for permanently docked exhibition ships, such as the *Queen Mary*, which had a permanent Amateur Radio station, W6RO, aboard. Also, remote control operating points are required to be land-based.

Station locations are defined as being the location of the transmitter. For DXCC purposes, remote operating points must be in the same DXCC entity as the transmitter.

Changes to Come

The ARRL Board report also mentioned future changes and enhancements for the DXCC program. Due to infrastructure requirements, these changes will be phased in over time, with the additional requirement that none becomes a budget buster.

Plans are underway to allow DXCC participants to file their submissions (new awards and endorsements) electronically. We're still working on the details. Under this program you'll be able to use your computer (or a friend's) to prepare your DXCC submissions.

Your electronic submissions will be easier for the DXCC Desk to process, and you'll have an electronic record of the transaction. That's a double win.

Close behind this, we expect to see a totally new program for field checking. We've had seven years' experience with the current program, and we've learned a lot during that time. However, this cannot change until the electronic submission program is complete.

Most of you have chosen not to use field checking (or at least you haven't been able to use it). It seems to us that we need a better geographic distribution of DXCC checkpoints. We'll also need to remove some of the limits on what can be checked.

You can expect that the new DXCC checkpoints will only handle electronic submissions. You as the participant will be entering data; the checkpoints will verify the entry and forward your submission to Headquarters. That results in savings and efficiencies that open the possibility of additional awards.

The vision is based on improved efficiencies and lower costs allowing us to add band awards for 20, 17, 15, and 12-meter bands. Because of an IARU agreement, we're not planning to add an award for 30 meters at this time.

For these awards, deleted countries would not count.

However, don't send your cards for these potential new awards yet. We need to see how things will develop as we proceed one step at a time.

King Kong?

The final step would be what in the beginning we called "King Kong." That was the working name for an award honoring the top DXer — Numero Uno. Standings are based on the total of current countries only on the bands 160 through 6 meters (not counting 30 meters at this time). This program now has a formal name, the *DXCC Challenge*, and would result in the awarding each year of the DeSoto Cup to the highest ranked DXer for the past year.

Will this take the place of the Honor Roll? Only time will tell. You can expect no Honor Roll style pileups with hundreds of individuals on each step. A new country on 80 meters or 6 meters can be just as valuable as that super rare operation on 20 meters.

Will this all be in place by year 2000? It's hard to tell. We're thinking about offering a special certificate during that year. This would not only commemorate the year, but would also be a celebration of the developments that are taking place in the DXCC program.

We'd like to know what you think about these ideas. You can write to: DXCC Desk at ARRL HQ or e-mail **dxcc@arrl.org**.

The DXCC 2000 Committee's Mandate

Minute 79 of the January 1996 Board of Directors meeting gave the following mandate for the DXCC 2000 Committee at its creation:

"Encourage broader participation by more amateurs, make the program more equitable, create better understood criteria for DXCC Countries, improve the process for reviewing requests for additions and deletions to the ARRL DXCC List and increase efficiency in the administration of the program."

Let's review some of the highlights of the program, and how the mandate is met:

- Broader participation by all amateurs will be met by providing more points of service. This will occur when electronic DXCC submissions are a reality, and an enhanced card checking program is started.
- The program will become more equitable over time by the gradual phase-out of the deleted countries. However, it should be pointed out that this is only a phase-out. Everyone will keep the credits they currently have.
- Political Entities are now truly defined in an understandable way. The addition process is also improved. Political Entities can now be added administratively to the DXCC List when they have qualified by application of the "1 of 3" test.
- The efficiency of DXCC program administration will be greatly enhanced by addition of the electronic submission option.

With the implementation of the full DXCC 2000 program, there's a lot to look forward to in DXing for the next century.

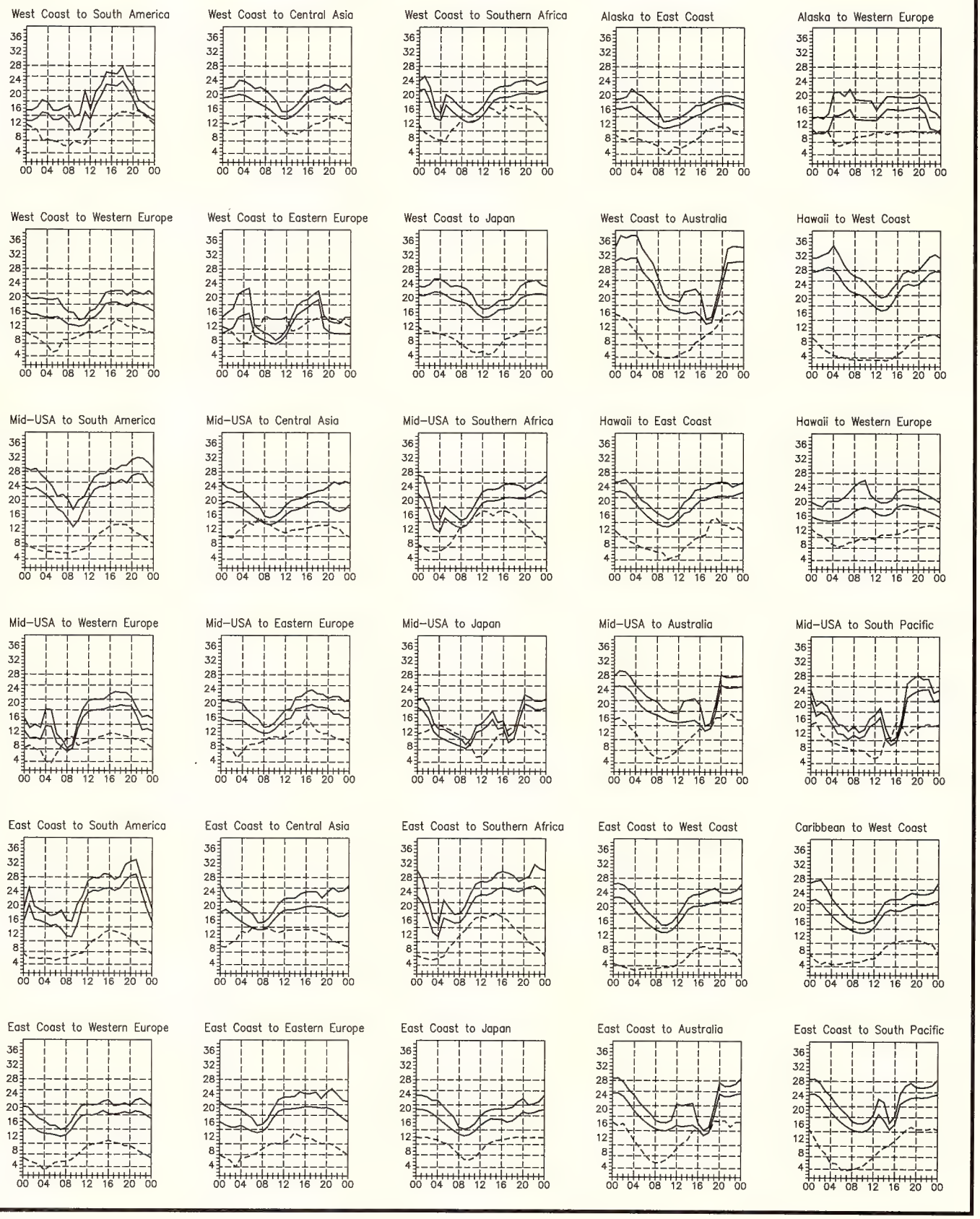
QST

New Products

VACUUM TUBE DATA MANUAL ON CD-ROM

◊ Designers, repair techs, collectors and ham home-brewers now can access detailed specs on more than 1200 popular vacuum tubes—including early "two-digit" types of historical interest—on one handy CD-ROM. *VTDATA*, produced by EPS/ Solutions, has everything you'd expect in a tube manual and more: pinout diagrams, detailed specifications, cross-referenced tubes, a substitution guide and a powerful search engine and inventory function. *VTDATA* requires an IBM-compatible computer running DOS 4.01 or later.

Price: $29 plus $3 s/h. For more information, contact EPS/Solutions, PO Box 862, Broomall, PA 19008-0862; **http://members.aol.com/EPSweb/vtdata**; e-mail **EPSweb@aol.com**. QST


West Coast to South America
West Coast to Central Asia
West Coast to Southern Africa
Alaska to East Coast
Alaska to Western Europe
West Coast to Western Europe
West Coast to Eastern Europe
West Coast to Japan
West Coast to Australia
Hawaii to West Coast
Mid-USA to South America
Mid-USA to Central Asia
Mid-USA to Southern Africa
Hawaii to East Coast
Hawaii to Western Europe
Mid-USA to Western Europe
Mid-USA to Eastern Europe
Mid-USA to Japan
Mid-USA to Australia
Mid-USA to South Pacific
East Coast to South America
East Coast to Central Asia
East Coast to Southern Africa
East Coast to West Coast
Caribbean to West Coast
East Coast to Western Europe
East Coast to Eastern Europe
East Coast to Japan
East Coast to Australia
East Coast to South Pacific
36 32 28 24 20 16 12 8 4
00 04 08 12 16 20 00

When are the bands open? These charts, generated using IONCAP+ from CAPman, show probabilities for average HF propagation from May 16 to June 15, 1998, for the paths indicated. The horizontal axes show Coordinated Universal Time (UTC), and the vertical axes frequency in MHz. On 10% of the days of this period, the highest frequencies propagated will be at least as high as the upper curves, and on 50% of the days they will be at least as high as the lower solid-line curves. The broken lines show the lowest usable frequency (LUF) for a 1500-W CW transmitter. For SSB or a lower transmitter power, the LUF will be somewhat higher than the curves indicate. See October 1994 *QST*, pp 27-30, and February 1995 *QST*, pp 34-36, for more details. The predictions for this period assume an observed 2800-MHz solar flux value of 117.

DX Century Club Awards

*Edited by **Bill Kennamer, K5FUV** • DXCC Manager*

The ARRL DXCC is awarded to amateurs who submit confirmation for contacts with 100 or more countries on *The ARRL DXCC Countries List*. The totals shown below are exact credits given to DXCC members from December 1 to 31, 1997. There were 329 current countries at that time. The DXCC rules and application forms are contained in *The ARRL DXCC List*, available for $3 from Publication Sales. The DXCC Web site may be found at **http://www.arrl.org/awards/dxcc/.**

NEW MEMBERS

Mixed

AP2TJ/118
DJ3JB/118
DK8RB/107
DL2KDW/212
DL4OCM/119
DL6AMI/120
DL7UKA/248
DL8UVG/117
DS4BHW/122
F8EP/118
IK8TWP/106
JA7FSB/263
JH3IMR/316
JL2PQV/161
KP4GC/101
KP4RF/231
LA1ZIA/110
RW3AX/154
SP6BAA/245
US2WU/284
YB2PBX/190
7N2KRX/314
9A4DA/106
WB1S/183
W1JIM/130
KB2YTN/108
K2DN/118
NG2V/195
WB2JTE/102
KM3V/317
WA3PRC/120
KC4K/229
KU4EC/104
NW4C/186
W4GBF/185
KB5GTO/176
W5TN/112
NO6X/130
NR6C/102
WA6YEE/116
KG7XC/178
KJ7HI/256
N7NN/274
N7SG/131
N7UF/109
AA8BX/104
K8GT/242
N8SHZ/180
W8GAZ/149
W8IFK/127
W8LKX/108
N9PQU/118
KG0UA/103
K0MP/105

Phone

AP2TJ/106
DL3NEO/104
DS4BHW/122
EA3AFJ/136
EA3ARL/126
EA3GJH/110
EA4AKY/128
EA4URE/103
EA6JN/114
F6BAT/104
JA7FSB/210
JH3IMR/234
JL2PQV/120
JN1BAH/313
SV1CIF/153
VK1TX/112
YB2PBX/154
7N2KRX/291
KM3V/143
KE4TGX/103
KR4NW/120
KB5GTO/176
W5RQ/138
K6XX/127
NR6C/101
WB6NFO/156
KG7XC/105
KJ7TH/129
K8GT/155
KB8QLT/100
N8AA/289
N8SHZ/177
N8XLS/103
WA8NBP/118
N9WT/100

CW

DF6SW/119
DL2GV/217
DL2KDW/185
DL7UKA/181
DL8ZBA/114
EA4AKY/111
EA5WI/135
EA8UH/151
I8QFK/158
IK1GCD/149
JH3IMR/108
JN1BAH/297
LU8DYH/109
OZ9MM/106
PP2JT/210
SM3BCS/317
UR7CA/107
US2WU/279
7N2KRX/146
K1MC/107
W1DJW/168
W1TC/327
NG2V/189
KM3V/303
KQ3F/263
N3AS/152
AC4XO/108
WA5PAE/225
WQ5G/132
K6SRZ/118
AB7II/162
KG7XC/151
N7NN/117
N7TP/136
N7UF/105
K8GT/227
N8AA/321
W9RB/110
W9UV/110
W0FS/114

RTTY

EA5FKI/230
LA1ZIA/103
W1TE/105
KM3V/111
W4DKS/103
AC0M/109

Satellite

OZ1MY/107

160 Meters

JE2LPC/106
S53X/108
VE5RA/110
N2KA/101
N3KK/100
N8AA/107
NR0X/128

80 Meters

LU2NI/148
US2WU/143
KQ3F/112
AD6W/105
KI6T/136
W7SX/127
NR0X/195

40 Meters

DK9KX/118
JL2PQV/108
JN1BAH/127
KP4P/108
OZ1FAO/163
US2WU/174
YB2PBX/102
YO2DFA/114
K1NU/101
NG2V/171
WA2ROJ/108
KQ3F/177
W4GF/103
WA5PAE/225
WF5W/125
WQ5G/121
AD6W/143
KI6T/189
AB7II/106
K8GT/117
W8ZQA/100
K9BJM/102
N9DJ/101
W9SE/107
W9UV/110
NI0C/104
NR0X/243

10 Meters

JA5IU/263
JN1BAH/235
US2WU/182
K1NU/102
KQ3F/190
W4RJ/101
KB5GTO/175
K6XX/129
KG7XC/116
W7WHB/105
K8GT/152
N9DJ/109

6 Meters

DJ5JK/101
HC2FG/103

5B DXCC

DL2GV
UN6T
UA0OA
US2WU
WO9F
AD6W
LU2NI
WB4RFZ
KQ3F
W3DM
N5MT
NC6A
SM6TEU
WA3I
IK4HPU

160 Meters

OZ8RO

17 Meters

LU2NI
W5EIJ
N6MM
DF1ZN

12 Meters

WO9F
LU2NI

NEW HONOR ROLL MEMBERS

Mixed

325

HB9BLQ/331
JN1BAH/325

323

JA6OXA/328
JE1SYN/327

321

OZ8RO/327
YU7FW/326
KS1J/329

320

OZ1FVL/325
N4AA/339

Phone

322

SP6ECA/330

321

YB5QZ/325

320

DL6DK/325
GM4UZY/320
JA4BXL/324

CW

321

W3YQ/329

320

HB9AQW/327
LA5LT/325
W1MK/325

RTTY

320

W5ZPA/325

ENDORSEMENTS

Mixed

A92FZ/157
DF6IM/242
DJ1TU/274
DJ1UR/321
DJ2XP/284
DJ5AV/318
DJ6OV/329
DK7YY/318
DK9KX/343
DL2GV/269
DL3NEO/196
DL5UF/241
DL6DK/330
DL9LAI/213
EA2IA/322
EA4JL/352
F5RUQ/315
F6CUK/338
G3OHN/327
HB9AZO/337
HL0CBD/130
IK1GCD/208
IK5MEN/167
IV3JWR/323
JA1JMF/319
JA1QXY/343
JA1SVP/341
JA3HZT/345
JA4BXL/329
JA9CG/343
JE2LPC/333
JF2MBF/332
JH1MQC/327
JH3CXL/340
JH4RLY/335
JI6URU/303
JJ1CZR/253
JL1YVV/205
JT1BG/310
LA4OGA/321
LA5LT/331
LU2NI/327
OE1HGW/359
OE2BZL/264
OE6DK/335
OK1MG/360
OZ1FAO/335
PY4OY/330
SK5PZ/261
SL0AS/333
SL0ZZI/271
SM3BCS/361
SM3CBR/302
SM3EKD/208
SM5BTX/165
SM6TEU/322
SM7HCW/338
SM7MPM/319
SP9AI/348
S53X/324
TI5RLI/325
UN6T/284
UR7CA/207
VE3BZ/343
VE5RA/340
XE1AMS/330
YO2DFA/228
ZL1ARY/359
ZL2VS/337
AD1E/297
KA1A/331
KA1CFA/224
KB1W/327
KD1F/315
K1IN/314
K1NU/235
K1QN/208
K1SF/337
N1AE/343
N1CQ/331
N1KB/278
N1NZ/227
WA1MKS/232
WA1QXR/264
WB1BVQ/329
W1CWU/312
W1GOU/181
W1OK/234
W1RZF/305
W1TC/340
W1TE/225
W1TY/319
W1WA/301
W1ZT/272
AE2JL/313
KA2CYN/331
KF2TI/265
KU2A/297
K2BT/346
K2CIB/326
K2EOB/159
K2FF/172
K2FR/318
K2FU/188
K2JG/208
K2JL/311
N2BJ/334
N2IFA/183
N2KA/342
N2KSE/182
WA2GEZ/339
WB2AQC/334
WB2GAI/255
WB2TVS/146
WR2V/301
W2DX/283
W2GFF/260
W2GXP/238
W2QM/372
W2RA/308
W2RD/330
W2SY/353
W2YC/306
W2YR/277
AA3DY/151
KK3S/319
KQ3F/307
K3ATO/310
K3SC/330
N3AS/178
N3KK/324
N3NY/169
WA3I/228
WA3NVS/315
WB3GOC/315
W3DM/229
AC4XO/188
AE4CR/146
AE4EI/244
KE4QDZ/184
K4GZ/252
K4QD/245
K4RD/342
K4UY/328
K4YA/329
N4SI/328
N4SJ/326
WB4FDT/212
W4AU/241
W4OEL/355
AA5XE/276
KK5XI/223
K5GS/333
K5JP/331
K5KEN/236
K5UZ/307
N5DRV/310
N5EPA/326
N5MT/334
N5RRA/235
WB5MTV/332
WF5W/272
WQ5G/186
W5AJ/335
W5EIJ/305
W5JE/341
W5OLN/330
W5RQ/323
W5TFV/289
AA6MP/295
AD6W/317
K6SRZ/151
K6XX/215
NC6A/304
WS6X/326
W6KFV/360
W6NVN/312
W6PMT/328
AB7II/186
K7FD/173
K7LZJ/331
K7XB/347
NW7Q/307
N7MQ/280
N7SEJ/285
N7TP/338
WA7OBH/294
WB7EEI/335
W7HS/311
W7RDX/311
W7SX/286
W7WHB/265
AA8R/324
KB8VA/289
KC8FS/331
KG8BK/311
ND8L/278
N8AA/354
N8JX/338
WB8YJF/312
WZ8A/198
W8AF/298
W8KL/330
W8LTX/267
W8PJY/264
W8SAX/275
KJ9C/240
K9BJM/238
K9NB/341
NA9A/296
N9DJ/331
WA9WJE/342
WA9YYY/326
WD9DZV/232
WO9F/306
WS9W/151
W9DDP/334
W9GXR/307
W9HP/311
W9SE/315
W9UOM/329
AB0X/339
KN0V/333
K0TVD/252
K0XB/304
NR0X/336
N0AH/206
N0EID/136
N0OP/162
W0EKS/338
W0FS/268
W0ML/302
W0MOU/168
W0PXM/328
W0TRF/342

Phone

CP2DL/270
DF1ZN/222
DJ1TU/262
DK9KX/342
EA4JL/352
EA5GMB/279
F5RUQ/309
G3OHN/152
HB9AZO/336
HB9BLQ/310
HK4CYR/327
IK8MVH/309
JA1JMF/254
JA1SVP/335
JA6OXA/313
JA9CG/337
JE2LPC/229
JF2MBF/329
JH1MQC/327
JH3CXL/334
JH4RLY/334
JJ1CZR/196
JL1YVV/205
JQ1ALQ/280
JT1BG/304
KP4P/336
KP4RF/229
LA5LT/297
LU2NI/327
OE2BZL/228
OE2YMO/322
OE6DK/332
OZ8RO/284
PY4OY/330
PZ5DX/195
SM6TEU/295
SM7HCW/336
SM7MPM/316
SV1CID/187
SV1LK/332
TG5ITS/173
TI5RLI/325
UR7CA/178
VE2YG/213
XE1AMS/330
ZL1ALE/346
ZL1AMN/347
ZL1ARY/354
ZS6NB/233
AA1AC/302
KA1VHK/294
KE1ET/165
K1SF/333
N1KB/177
WA1MKS/232
WA1QXR/264
WB1BVQ/329
W1GOU/161
W1OK/189
W1RZF/280
W1TE/176
W1TY/319
W1ZT/201
KA2CYN/329
KF2TI/265
K2FF/170
K2FR/296
NN2Q/324
N2BJ/333
N2IFA/183
N2KA/335
N2KSE/182
WA2HMU/286
WA2PNI/273
WB2AQC/327
WB2TVS/144
WR2V/301
W2EJG/223
W2GXP/220
W2RD/328
W2SIS/265
W2YR/238
AA3DY/151
AA3FC/160
KQ3F/252
K3ATO/273
K3IXD/266
K3KFD/237
N3KK/315
N3NY/166
WA3NVS/313
AC4XO/177
AE4CR/142
AE4EI/236
KA4IWG/328
K4GZ/194
K4QD/210
N4AA/265
N4SJ/324
WB4FDT/145
W4GF/139
AA5XE/269
KK5XI/220
KX5V/324
K5GS/332
K5KEN/236
K5UZ/285
N5DRV/229
N5EPA/306
N5GO/238
N5RRA/235
WA5KVO/321
WF5W/173
WQ5G/161
W5OLN/298
W5TFV/253
AA6MP/291
AD6W/228
KB6NAN/186
KF6SK/300
KG6B/330
WS6X/288
W6PMT/328
K7LZJ/331
K7XB/342
NW7Q/306
N7FLT/267
N7MQ/258
N7NN/254
N7SG/130
N7TP/338
WA7OBH/287
WB7EEI/335
W7KEU/286
W7RDX/311
W7WHB/263
AA8R/287
KB8VA/263
KC8FS/329
K8EK/250
K8UPG/125
ND8L/244
N8JX/337
WB8K/194
WZ8A/142
W8AF/296
W8LTX/231
W8NPF/321
KA9W/203
K9BJM/218
NA9A/267
N9DJ/288
WA9WJE/164
WD9DZV/190
WS9W/151
W9DDP/331
W9GXR/277
W9HP/311
W9UOM/324
AC0M/324
KE0K/182
NR0X/301
N0LT/229
N0OP/140
N0OSS/218
W0FS/261
W0HBK/174
W0PXM/328
W0YMH/347

CW

DF6IM/196
DJ1TU/240
DJ2XP/258
DK9KX/331
DL3FT/231
DL3NEO/187
DL6DK/311
EA4AV/307
EA4KU/198
G3OHN/187
HB9DDM/319
JA1JMF/160
JA1QXY/323
JA1SVP/325
JA3CMD/335
JA4BXL/183
JA5IU/330
JA9CG/332
JE2LPC/222
JF2MBF/316
JH3CXL/338
JH4RLY/140
JJ1CZR/229
JL2PQV/154
OE2BZL/229
OK1MG/336
OZ1FAO/333
OZ1FVL/314
OZ8RO/308
SK5PZ/242
SL0AS/333
SL0ZZI/270
SM3CBR/293
SM6TEU/314
SM7HCW/331
SM7MPM/252
SP5GH/313
AA1AC/280
AD1E/286
KD1F/290
KS1J/297
K1IN/173
K1QN/176
N1KB/242
W1OK/191
W1TE/192
W1WA/296
W1ZT/205
K2EOB/144
K2JL/233
K2JLA/331
N2KA/245
WA2ROJ/124
WB2AQC/248
WB2GAI/255
W2DX/252
W2EJG/301
W2GFF/228
W2GXP/184
W2RA/293
W2RD/156
W2YC/281
W2YR/146
KK3S/302
K3ATO/226
N3KK/316
WA3I/215
WB3GOC/299
W3DM/158
AA4DO/330
K4CN/329
K4GZ/223
K4QD/176
K4UX/286
K4YA/317
N4AA/256
N4SI/316
WB4FDT/183
W4AU/199
W4DZZ/317
W4GBF/181
W4OEL/320
KA5GMN/292
K5UZ/203
N5DRV/253
N5EPA/278
WF5W/225
W5AJ/272
W5EIJ/215
W5JE/262
W5OLN/277
W5RQ/296
W5SVZ/314
AD6W/280
K6RJ/210
K6XX/188
K6YR/132
N6MM/174
WS6X/258
W6NVN/291
W6TVP/310
K7XB/300
N7MQ/210
WA7OBH/176
W7SX/268
AA8R/191
KC8FS/242
ND8L/220
N8JX/333
WB8K/197
WB8YJF/304
WZ8A/143

KJ9C/231
K9BJM/106
NA9A/242
N9DJ/260
WA9YYY/317
WD9DZV/165
W9DDP/323
W9GXR/247
AB0X/325
AC0M/304
NR0X/288
N0AH/134
W0FS/114

RTTY

JA3CMD/307
JF2MBF/233
OZ8RO/129
PA0TAU/161
SM3BCS/192
KA2CYN/153
W2UP/310
N3KK/236
K7XB/277
N8JX/312
WB8YJF/230
K0XB/193
W0ML/263

Satellite

JF2MBF/144
TI5RLI/116
WA1QXR/164
W2GFF/179

160 Meters

OK1MG/179
PA0TAU/166
SM3BCS/118
SP5GH/140
W1ZC/156
W4OWJ/232
N6AR/136
K8PV/162

80 Meters

A92BE/196
HB9AZO/121
HB9DDM/143
IK4HPU/144
JA3CMD/187
JA5IU/246
JA9CG/171
JE2LPC/140
JF2MBF/198
JH4RLY/122
OE6DK/143
OZ1FAO/123
OZ8RO/178
SM6TEU/169
SM7HCW/171
SP5GH/221
TI5RLI/195
VE5RA/198
AA1AC/163
KA1VHK/145
KD1F/166
W1MK/291
KA2CYN/172
KU2A/113
WA2ROJ/125
WB2AQC/110
WR2V/112
K3IXD/104
W3DM/113
N4AA/128
K5UZ/116
W5GO/111
W5JE/119
K6RJ/114
NC6A/132
N6AR/296
K7XB/169
WB7EEI/120
KC8FS/119
K8PV/257
WB8K/128
AC0M/168
W0FS/208

40 Meters

A92BE/233
HB9AZO/131
HB9DDM/209
IK4HPU/188
JA3CMD/242
JA5IU/308
JA9CG/222
JE2LPC/181
JF2MBF/251
JH4RLY/189
LU2NI/212
OE6DK/208
OZ8RO/268
SM3CBR/160
SM6TEU/206
SM7HCW/260
SP5GH/230
TI5RLI/225
VE5RA/224
AA1AC/208
KA1VHK/169
KD1F/212
W1OK/153
W1TE/129
KA2CYN/153
KU2A/121
WB2AQC/152
WB2GAI/161
W2EJG/208
W2RD/134
W3DM/141
AA4DO/272
K4GZ/141
N4AA/213
W4AU/136
W4GBF/136
KX5V/114
K5UZ/137
W5EIJ/117
W5JE/132
W5OLN/175
W5RQ/164
KG6B/270
K6RJ/134
K7XB/279
N7MQ/125
N7TP/144
W7SX/247
AA8R/148
KC8FS/185
K8PV/312
ND8L/150
WB8K/173
WB8YJF/160
W8QWI/128
KJ9C/180
NA9A/178
W9GXR/185
AC0M/265
KB0HJ/113
W0FS/186

10 Meters

DK9KX/284
GM4UZY/159
HB9AZO/169
HB9DDM/265
JA1JMF/108
JA3CMD/319
JA9CG/229
JE2LPC/198
JF2MBF/228
JH4RLY/219
LU2NI/292
PA0TAU/301
SL0AS/214
SM3CBR/126
SM6TEU/169
SM7HCW/262
SM7MPM/256
TI5RLI/170
VE5RA/212
ZS6NB/130
AA1AC/160
K1SF/223
KF2TI/125
N2IFA/140
WA2ROJ/189
W2RD/180
W2YR/138
K3KFD/201
WA3NVS/262
W3DM/142
N4AA/223
N5MT/246
W5AJ/132
W5EIJ/203
W5GO/232
AD6W/146
KB6NAN/186
KG6B/277
NC6A/128
N6AR/318
K7XB/194
AA8R/158
K8PV/287
WB8K/173
W8PJY/150
W8QWI/210
NA9A/125
WD9DZV/151
W0PXM/177

6 Meters

DK9KX/105
G3COJ/121

DXCC Notes:

The DXCC Desk is in the midst of a complete computer system changeover. Due to the changeover, there will be some delays in processing, and listings also will be delayed. All listings will be printed when completed. The new computer system is expected to give us increased future flexibility. We regret any temporary inconvenience, but we believe DXCC participants will find the new system to be a substantial improvement.

The ARRL Membership Services Committee announced that both the ARRL DXAC and Awards Committee have voted to delete Southern Sudan, ST0. While the status in Southern Sudan changed in 1983, QSOs made before January 1, 1995 will count for the deleted entity. There are two reasons for that. First, there have been accredited operations since 1983, and that raises a "fairness" issue. Second, the DXCC Desk has processed cards from those operations—many of them onto paper records. Because each ST0 credit would have to be individually checked, it would be very costly to the League in terms of time and money to search and remove post 1983 ST0 QSOs from the records. In fact, it might not be possible to do the job completely and accurately.

At the same time as the ST0 vote, both committees agreed to make no change in the status of Fernando de Noronha, PY0F, and Kure Island, KH7K. QST

New Books

DXing on the Edge—the Thrill of 160 Meters

by Jeff Briggs K1ZM

Published by the American Radio Relay League, 225 Main St, Newington, CT 06111; tel 888-277-5289 (toll-free orders only). First edition. ISBN 0-87259-635-4. Available from Amateur Radio retailers or the publisher. Order item #6354. $29.95 plus shipping and handling.

Reviewed by Craig Clark, W1JCC

Many, many moons ago, I was tuning my grandfather's radio across 160 meters. Most signals were pretty weak. One, however, stood out above the others as being quite loud. It sounded almost like a local broadcast station. Listening intently to a deep discussion on antennas for best DX performance, I waited for the transmitting station's call sign. It turned out to be 160-meter legend Stew Perry, W1BB.

I was fascinated as they discussed physical size, gamma matching, receiving antennas and much more. Everything was so large and—to my young mind at least—almost beyond comprehension. Several years later, after getting my Novice ticket (WN1IGG) in 1967, I spent even more time listening to 160 and waiting for the day I could join him on Top Band.

When I upgraded to General, the very first band I built an antenna for was 160! I began to chat nightly on 160 and got to know many of its denizens. Most evenings I chatted with W1AR, WA1FDV (now W1UL,) K1MBI and other locals. Later in the evening, the DXers would come out, and I had a number of interesting and informative QSOs with Stew and his group.

Bitten by the same bug as I, Jeff Briggs, K1ZM, provides a fascinating look at 160. Jeff dedicated his book to Stew Perry, W1BB, because he recognized that Stew's persistence after World War II secured 160 for Amateur Radio use and held off the threat that LORAN-A would take over the whole band.

One of the great mysteries of 160 is, "How does the band work?" Located just above the Standard (AM) Broadcast Band, 160—unlike bands such as 15 or 20 meters—is not immediately associated with long-haul DXing. Yet, many have made contacts tens of thousands of miles away with relatively modest stations. Jeff covers this phenomenon as well as the "early" years of 160 in the first chapter.

Chapters 2 through 8 cover 160 DXing from 1930 to the present. Jeff accurately relates the exciting events of these years. He has plenty of photos too—showing stations, locations and other interesting information. By today's standards, the stations, equipment and antennas then were quite primitive. In those days, your ears and brain were your DSP filter!

After the advent of LORAN-A, the government imposed severe power restrictions on 160. Working DX with just 25 W at night above 1825 kHz was no easy feat. Yet it was done regularly. Jeff covers this era in fascinating detail. In chapter 7, Jeff documents the end of LORAN-A in May 1981and the celebration by US 160 meter operators over the elimination of power and frequency limitations. This momentous change opened the door to DX opportunities Top Banders had only dreamed about.

My favorite was chapter 10, "Best-Ever" 160-meter DXing Anecdotes. These stories detail the excitement and thrill that many of us have had from 160 operation. I especially enjoyed the story of K9UWA's feat of working VU4GDG.

Chapters 11 and 12 cover antennas and the secrets that are used to get the most "bang-for-your-buck" on both transmitting and receiving. Jeff shares some of the secrets that have helped him to be so successful over the years. There's no magic here either; it is all common sense and sound engineering.

Chapter 13 gives you the ten rules to operate by. These tidbits are worth their weight in gold.

In the last two chapters, Jeff concludeswith a look at the future and his predictions of the fun that is to come—plus a photographic potpourri of operators, stations and antennas.

What really makes this book unique is that Jeff has compiled an audio CD-ROM of some of the most memorable events on 160 meters. I was spellbound ! W1BB working UK2PCR as taped in Germany by Peter, DJ8WL, "searchlight" propagation from ZL3GQ, and a real exotic QSO—K1ZM working XZ1N as taped by VE1ZZ.

For the 160 meter old timer, this book offers a fascinating look back at the band and its history. For the Top Band beginner, it gives a sense of what came before. This book held my attention as well as any Tom Clancy techno-thriller. I had fun recalling W1BB and the others who have passed on before. Jeff has done a good job with this book. I hope you will enjoy it as much as I did!

Craig Clark, W1JCC, lives in Rindge, New Hampshire, and operates Radio Bookstore and Radioware. He holds 160-meter DXCC #83. QST

Rick Palm, K1CE • *Field Services Manager*

Reading the Mail

The opinion piece in our March column, "Toward a Unified Amateur Radio Emergency Service," by Roy Van Riper, W7VR, evoked quite a response. Here is a sampling of some of the feedback.—K1CE

Mr. Van Riper proposes a single organization and poses the question "should it be ARES or RACES?" I suggest that this does not have to be a win/lose, either/or situation. At the local level, it can be a win/win situation. I would suggest that Mr. Van Riper and other ROs and ECs elsewhere consider implementing what we have done here in Boulder County, Colorado.

The local organization is the Boulder County Amateur Radio Emergency Services, Inc, or BCARES for short. BCARES members wear both ARES and RACES hats interchangeably. I accomplished this easily in 1990 while I was the BCARES chairman by negotiating Memorandums of Understanding (MOU) with the various agencies we serve. The key MOU was the one between BCARES and the Office of Emergency Management (OEM).

We normally function as ARES. The key element in our MOU relating to RACES reads as follows: "The [OEM] recognizes BCARES as the official RACES organization for Boulder County."

During normal local emergencies or large public events, BCARES functions as ARES while in a national emergency we automatically become RACES. This is a win/win arrangement.

BCARES is incorporated as a not for profit corporation, run by a Board of Directors. There are seven directors with one director each from the OEM, the Boulder Regional Communications Center (BRCC) (our local countywide 911 dispatch center) and the three ham clubs in the county. The OEM serves as the registered office of BCARES and is also the treasurer. All members of BCARES are licensed radio amateurs, must attend training classes and must be approved by the Boulder County sheriff after a background check. All members carry an emergency service photo ID card issued by the sheriff. The officers of BCARES carry pagers issued by the BRCC to enable quick activation in the event of an emergency.

The agencies served by BCARES include the BRCC, sheriff, several police and fire departments, US Forest Service and the Red Cross. Services provided include TV, packet, 2-meter FM voice and HF SSB. Television is the most often requested service. Funding for BCARES comes from FEMA, grants from served agencies, along with private and corporate donations.

Jim Andrews, WAØNHD
Former Chairman, BCARES
Boulder, Colorado

As for agreement, yes. I think Mr.Van Riper made a good case for combining the services, and that that is the way to go for more effective and broader-based ham radio emergency response.

Alan Bosch, KD4FRK
Emergency Coordinator
Arlington County, Virginia

I totally disagree with Mr. Van Riper's article. I live in Montgomery County, Indiana and if it wasn't for RACES we would have no ham radio emergency service. The local club does nothing for the community as they have less than 10 members. Our RACES group holds ham classes, conducts weather spotting training, runs severe weather watches, operates Field Day, handles traffic at public events, and runs its own repeater. We have a Radio Officer, and our director has 25 years of experience. We have up-to-date equipment and two emergency vans. Now tell me ARES is better than RACES. Please run another opinion.

James Brann, KB9NXG
Crawfordsville, Indiana

I fully agree with Mr. Van Riper's article in all aspects. We have the problem of appointed officials being involved in the selection of our emergency coordinator. The choice was purely political without regard to health and welfare of the community or Amateur Radio. Things need to change! How much would it take and how do we go about getting FEMA to amend their regulations to accommodate a better organized and operating system?

Ray Melosh, N8CPO
Howell, Michigan

Amateur Radio emergency communications varies in organization from place to place. The old ARES/RACES dichotomy (in California, add ACS and others) is slowly becoming a thing of the past. The FEMA/ARRL (ARES) relationship continues to develop. With cuts in federal, state, and local programs across the country, the government is beginning to realize the value of private, voluntary resources (such as the ARRL).

In areas where there is an ample supply of trained and disciplined operators, each agency may have its own group of "auxiliary communication personnel." Where that luxury exists, it has some advantages. But it can also have some disadvantages such as unhealthy competition, lack of coordination, and power struggles, problems that result in increased risk during multi-agency incidents, loss of time, property, or worse.

As ARES EC for Siskiyou County, as well as Assistant OES/RACES/ACS Officer), I see it as my job to coordinate all of the amateur resources for these and other—Red Cross, National Weather Service—activities. Located in the northern part of the state, Siskiyou County is the fifth largest county in California, with a population of 45,000. With only 100 active hams, 50 of which are registered ARES members, we don't have the luxury of each served agency being able to have its own group of communicators (as they do in some of the larger metropolitan areas). Most of the 50 are also registered with RACES/ACS, and many are also trained in Red Cross functions such as damage assessment. We strongly support and encourage the cross training of ARES members and cooperation with all of the agencies and organizations we serve. If we run short of registered and trained operators, we activate a mutual aid plan rather than hastily press untrained, undisciplined operators into service.

If an individual operator wants to join up with a specific agency, the agency will usually tell them, "Join ARES first. We get our trained operators from them." So far, this has worked well since it provides better coordination and utilization of our volunteer resource. It also means less work and headaches for the agency. The agency often will then provide additional training that is specific to their needs.

One last comment: I am aware that in many areas of the country, ARES has not been very active (or is nonexistent, for that matter). If we (ARES) don't do our job, someone else will! This is one reason for other groups to "re-invent the wheel"!

Dave Thorne, KC6HOY
Emergency Coordinator
Siskiyou County, California

I thoroughly agree with Roy Van Riper, W7VR, that a unified Amateur Radio emergency service is a critical need. He is also correct that ARES is the best vehicle for achieving a unified service. But at the same time I hesitate to throw out RACES "with the bath water."

I've been the Emergency Coordinator for Chatham Borough and Chatham Township for at least 20 years. These two municipalities have separate governing bodies, police and fire departments, and Offices of Emergency Management (OEM's), but

share public schools, one emergency squad and one library. For us a combined RACES of the Chathams has worked very well.

To solve the leadership problem that Roy Van Riper so correctly cites, I wrote into the Emergency Plans for the separate RACES in each municipality, that the EC of the Chathams, as appointed by the SEC of Northern New Jersey Section of the ARRL, directs both RACES. In addition he/she appoints the Radio Officers for both RACES. All these appointments are subject to approval by the OEM Emergency Coordinators of each Municipality.

Under this leadership we have achieved very good recognition in both communities as a needed and legitimate emergency service. We are included in all OEM drills, and public service events in both communities. I always request, and get approval, for a RACES drill in the fall of each year that will also count as our SET. The advantages of this close working arrangement include among others, budgets for equipment and other expenses, permanent operating positions in municipal buildings and insurance coverage. Because RACES is so well recognized by the politicians and emergency service personnel on both communities, I don't even talk about ARES. It would just confuse them.

However, to achieve the overall flexibility that Roy Van Riper so correctly attributes to ARES, I require all hams who register with RACES to also register with ARES. In addition, any ham that feels he/she cannot make a full commitment to RACES can sign up for full or limited ARES membership. This flexible membership also solves some conflict-of-interest problems. One of our best ARES operators is heavily involved with the local chapter of the Red Cross. His first loyalty has to be to the Red Cross, and thus he felt he could not sign up with RACES, but could be a full ARES member.

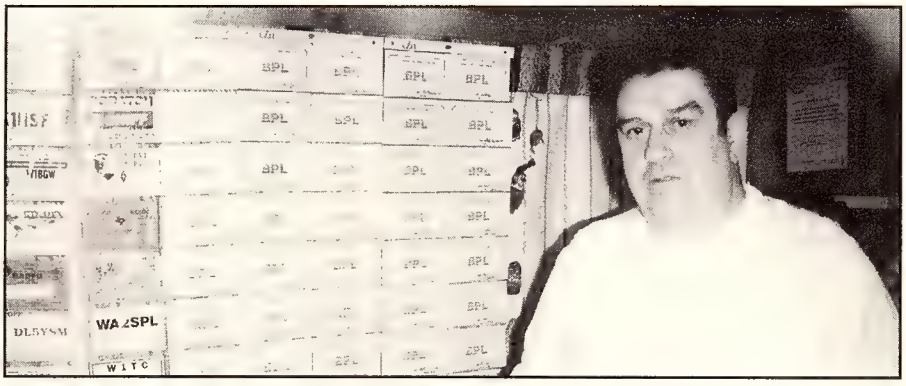
The biggest problem, as I see it, to a combined emergency communications service will be who allocates operators to whom in a large-scale emergency. Here in the Chathams the two OEMs will expect to assign RACES operators to best fulfill their needs first. This may leave the Red Cross, Salvation Army, and others out in the cold. ARES, as a combined emergency communications service could make more appropriate allocation of operator and equipment resources, but would the OEMs accept that? That's not very likely here in the Chathams.

I hope the ARRL and FEMA can develop an understanding to solve this and other problems standing in the way of a combined amateur radio emergency service.

Otmar P. Schreiber, W2UH
Emergency Coordinator, The Chathams
Chatham NJ

Jack Bowles, N1OTC, Traffic Handler Par Excellence

On March 23, 1993, John "Jack" Bowles, N1OTC, received his ticket and from that date forward, he was a traffic handler. Jack bought a radio, and a Vibroplex, the same type of key he used during his Army days. He went home and threw a G5RV antenna over a tree branch, thus beginning his career.



Jack Bowles, N1OTC, stands in front of his award cards for 50 consecutive BPL qualifications.

A former US Army communications sergeant, Jack had begun to reacquaint himself with Morse code while studying for his Novice; it came back to him quickly. He had also handled traffic in the Army. He quickly began checking into various traffic nets, disrupting them by not following protocol. Realizing there was a difference between Army traffic handling and what the National Traffic System (NTS) required, he found a slow code training net for new traffic handlers, the Eastern Massachusetts-Rhode Island Slow Speed Net (EMRISS), on which he learned the protocols.

He then checked into the Boston area nets, taking traffic, and volunteering to help whenever he could. He soon found himself appointed to regional nets. Jack used all modes, enhancing his ability to move traffic. He became known as both a top-notch CW operator and an excellent traffic handler.

During this time, he noted an article in *QST* about the Brass Pounders' League. He made up his mind to earn 50 consecutive BPL awards. Although many traffic handlers have more BPL awards, his awards would be for consecutive *months*, a more difficult achievement. During this adventure, Jack would earn more than 50,000 points.

Jack has always been passionate about his traffic handling. Once a piece of traffic landed on his desk, it would be moved quickly to its destination. Never would a piece of traffic sit until another day. Because of this dedication, he earned the respect of all that have had occasion to work with him, as well as the A-1 Operator certificate.

Jack's regular routine included at least 12 nets a day, seven days a week, with service as net control station. He could be heard anywhere from local nets to TCC. He regularly stepped in for other NCSs who were unable to make their appointed times. He handled several hundred messages every month.

Jack earned a couple of BPL awards. Then he found himself at the end of a month with only 499 points. He could easily have made up a message to get the extra point needed, but that is not Jack's way. No one would have known better, but Jack would have known that he had cheated, so he submitted the 499 points, and began his mission anew the next day, starting again to earn number one in the series of 50 BPLs. Jack then tallied more than 500 points every month for *50* consecutive months. He was usually closer to the 1000-point mark.

During the 1995 hurricane season, when four storms hit the US Virgin Islands in four weeks, Jack was a vital link between victims and their relatives here in the Northeast. He personally made dozens of telephone calls to anxious friends and relatives to assure them that their loved ones were all right. Another time, a freighter off the US coast was sending SOS, and Jack monitored the station until the Coast Guard brought the shipmates to safety.

During all of this, when some people might puff out their chest and revel in their self-importance, Jack always remained humble. When interviewed for a newspaper story about his efforts during the 1995 hurricane season, he stipulated that he would grant an interview only with the understanding that the focus would be on the importance of ham radio as a means of communications, not on him personally. When a Boston television station interviewed him, the terms were the same: focus on Amateur Radio, not on the man.

Jack is always considerate of other operators. Whenever less experienced hams check into one of his nets, he slows down his sending speed accordingly. He often takes time after his net to answer questions. If a less experienced CW operator wants to practice with him, Jack will always make time. He has been instrumental in helping several hams become better CW operators. In a time when we see more and more of the traffic being moved via e-mail, you can always be sure that Jack will still use the NTS.

Jack recently retired from acting NCS for the many nets he covered. Although he still checks into the nets occasionally, his regular presence is sorely missed. It will take many good operators to fill his shoes.—*Cris Coppellotti, AA1MU* QST

The Sequence of NTS Nets

If you have been listening to or participating in National Traffic System nets, you may have heard the term "cycle," followed by the number one, two, three or four associated with the name of the region or area net. What does this mean?

A cycle refers to the net's scheduled meeting time. The order in which the various National Traffic System nets meet is essential to the proper operation of the system. The effectiveness of the NTS depends on a delicate balance of voluntary cooperation and adherence to established procedures. In 1979, the NTS Area Staffs jointly recommended a symmetrical, four cycle NTS net sequence, which has now been accepted as the formal system definition. Refer to the sidebar that shows the schedule in local time.

The clever part about the National Traffic System schedule is that in any given cycle, all nets in the same level commence at approximately the same local time. This allows time for liaisons to the next level to pick up any outgoing traffic and meet the next net. In addition, this gives the Transcontinental Corps (TCC) stations at least one hour before their duties start on another area net or their schedule begins with another TCC station. Let's examine this schedule.

The schedule plan calls for each area net (Pacific, Central, and Eastern Area Net) to hold a session per day at approximately 11:30 AM, 2:30 PM, 5:30 PM and 8:30 PM local time. Sixty minutes has been allotted to each session of the net to clear inter- and intra-area traffic. The system is symmetrical, regular and repeatable. This means, first, that the structure of the net sequencing is consistent from area to area, and second, that a net session occurring at a given local time in the Eastern area should subsequently occur at the corresponding local times in the Central and Pacific areas.

The NTS schedule shows four cycles of traffic nets, but usually two cycles are sufficient to handle a normal load of traffic on the system. However, during heavy traffic periods (such as the holiday season) or in times of emergency, many more messages are brought into the system, and the NTS responds by utilizing additional cycles. The cycles of normal operation are Cycle Two, the "daytime cycle," which consists primarily of phone nets, and Cycle Four, the "nighttime cycle," made up mostly of CW nets. In addition, Cycle One is implemented in the Pacific Area, and Cycle Three is implemented in the Eastern Area to facilitate intra-area and west-to-east traffic flow.

You may find more information in the *Public Service Communications Manual* (available for $1 from Headquarters) or via the ARRL Web Page. Look for it at **http://www.arrl.org/field/pscm**. NTS nets and schedules are presented in the *ARRL Net Directory* (available for $4 from Headquarters).

NTS Net Schedule

Cycle One		*Cycle Three*	
10:00 AM	Section	4:00 PM	Section
10:45 AM	Region	4:45 PM	Region
11:30 AM	Area	5:30 PM	Area
12:30 PM	Region	6:30 PM	Region
Cycle Two		*Cycle Four*	
1:00 PM	Section	7:00 PM	Section
1:45 PM	Region	7:45 PM	Region
2:30 PM	Area	8:30 PM	Area
3:30 PM	Region	9:30 PM	Region
		10:00 PM	Section

Public Service Honor Roll
February 1998

This listing is to recognize amateurs whose public service performance during the month indicated qualifies for 70 or more total points in the following 8 categories (as reported to their Section Managers). Please note the maximum points for each category: 1) Checking into a public service net, using any mode, 1 point each; maximum 60. 2) Performing as Net Control Station (NCS) for a public service net, using any mode, 3 points each; maximum 24. 3) Performing assigned liaison between public service nets, 3 points each; maximum 24. 4) Delivering a formal message to a third party, 1 point each; no limit. 5) Originating a formal message from a third party, 1 point each; no limit. 6) Serving as an ARRL field appointee or Section Manager, 10 points each appointment; maximum 30. 7) Participating in a communications network for a public service event, 10 points each event; no limit. 8) Providing and maintaining an automated digital system that handles ARRL radiogram-formatted messages; 30 points. Stations that qualify for PSHR 12 consecutive months, or 18 out of a 24-month period, will be awarded a certificate from HQ upon written notification of qualifying months to the Public Service Branch at HQ

821 NM1K
362 W9RCW
341 KF4QU
340 K5MC
262 N5NAV
254 NZ4O
252 W6DOB
251 N4ZNO
250 WB4GM
248 K4SCL
240 WB2UVB
232 K7BDU
228 N5OUJ WA5AA
217 WA9VND
206 W4PIM
200 W7TVA
199 N2LTC KD4SIV
191 W2HOB KA2YZM
188 K6YR KB8ZYY
185 KA2ZNZ N2YJZ
184 K2UL N5JUU
183 WA1TBY
182 N2WFN
180 N2MSM WB5NKC
178 K9FHI N5IKN
177 W5RZV
175 W9YCV
174 KK3F K7VVC
172 WA1JVV
170 KC4RNF
169 AD4DO
168 KA2GJV KD4PDQ NØKJ
167 AF4EG
166 N2OPJ
165 KC4QGI
162 W6IVV
161 WØOYH
160 N2FET W9CBE KAØUEQ
159 KR4MU KB2VVB N1VXP KA4FZI N2OJI N2JBA
158 W7WAT KF1L
157 KB2RTZ N8FPN
156 K9RTB
155 WB1GXM
154 KB2VSD WB5ZED NR2F
153 KD4GR W7RFM
152 W4EAT N2RPI
151 KE4OAV
150 K4IWW K2DN W6QZ KD7ME
149 N2FHJ AAØOM
148 W3YVQ WA7EES K5DPG KB2WII W5YQZ KIØJO
147 WA2CUW KC4ZHF
146 NX1A KE4DNO
147 WØLAW
145 K2BCL WB0ZNY
144 N8IXF WA1FNM KC5OZT WB2ZCM KT1Q
142 WB6OTS W4BNY KA1OTN AD4BL
141 AB7NK KA9EIZ WA4GQS
140 N2AKZ N1LKJ AA4T AA2ED W2MTA
139 N9BDL
138 AA2SV WA4QXT W7GB W7ZIW
WA4NDA
137 N2GJ WX8Y KB2TIY AF4GF KT6A
136 KB2KLH K2GNZ
135 KE4JHJ KA1GWE NY2V K7GXZ
134 WB9TUS N2WGF WB2EAG N4YYQ
133 N2XJ KL7Q
132 KE6NTZ KA4UIV WI2G
131 N8FWA N2XOJ W7VSE K5IQZ WØOTF
130 K4CWZ WNØY
129 WAØTFC
128 AE4AZL WOØA AE4UB K4RBR NN2H
126 WD4EKA KA7AID WA4EIC KF9AS K5WOD N1CPX AC4CS
125 WB2GTG NZ1D KEØK
124 AE4EC KF4TQX WX4H
123 KI4YV KC2ACL W2RJL W7GHT
122 KE4PAP
121 WB5CDX W2FR N4JAQ
120 K4MTX NR9K N7DRP KE4IFD KC5QZZ KB5TCH N7YSS
119 K5AO N1DHT
118 K9GBR W9UMH KØPIZ W4CKS
117 WB8KWD WA3YLO W1ALE W1PEX KF4NFP N4GMU
116 KB2KOJ WB5NKD
115 KA7YYR KA1WCD KA2DBD KU4IJ WD5GKH
114 KB3AMO WD4MIS KE1AI AF2K
113 WB2QIX
112 N8DD W4JLS
AA9HN KE6MIW AG9G KG2D WA2UKX
111 KG6TU W2MTO KA9KLZ
110 K4AIF W2AZ WB4KSG KG5GE WB7VYH WB4TVY W5ZX
108 WA2JSG WDØGUF KT4SJ W2PII W4DGH WB5YDD WB2FGL
107 KA1VEC KO6RZ
106 W5RIT WB2CZW N9KHD KH6GR K5UCQ
105 KB2YJD KC5VLW KB2UQZ
104 N2ZMI WA8SSI K3GHH KC5PNM W4XI
103 N2AYK WA8DHB N2CCN AE4WP W5MEN
102 NØOUD W5CTZ
101 N3WKE KE4CAP
100 KC3Y
WB4ZNB WD5AAH
99 KE3OX WB4UHC KD4TQN WA5FZQ K7MQF
98 N7UOF
97 W1JTH W7UVP KD6YJB
96 AA4YW WB4PAM W7EP
95 N1YVV N8JSO WA4LXP
94 WB2IJH
93 W7NWP
92 KE6GFV AA8PI N8TDE
90 KD4HGU WR8F WD9FLJ
89 K8ZJU KC6SKK
88 KØPY KGØIV NN7H
87 K2DYB KC2CSQ WØMZI W5XCU WB9GIU
86 N8YXL KB2ETO
85 W5RIT WB5CXK KA9FVX AB5RV
84 WA1QAA
WA3WRT KO4OL KB2GEK AA8SN WBØDTI KG7LS
83 WA5FXQ
82 KB8ROA KA4LRM N2WDS W4QAT
81 W4ZBA KB2VXF
80 KJ3E KE3FL KF4FXT W4JF
79 KD4FQG N8VES N3WK K4BW
77 K2VX W2CC
76 KC2AGL
75 KB4WBY
74 KE4YXW KR4ZO
73 W2CS KA2ZKM NB2D N5BMB
72 KE2EH KD4JMV K3UWO
71 K8WC N4MM
70 N2SOE KB2YBM N2FHK KB2VSR KC2CLD KØIBS WA6DQK KAØDBK

The following stations qualified for PSHR during the month of January 1998, but the results were not reported in April 1998, *QST*: WD4EKA 135, KB2WII 152.

Section Emergency Coordinator Reports
February 1998

There are 41,218 ARES members accounted for in SEC records. The following section emergency coordinators reported: AL, CO, ENY, EWA, GA, ID, IN, KY, MDC, MI, MN, NFL, OH, SD, SFL, TN, VA, VT, WMA, WV, WWA.

Section Traffic Managers Reporting
February 1998

AL, AR, AZ, CO, CT, EMA, ENY, EPA, EWA, IA, ID, IL, IN, KY, LA, ME, MI, MN, NC, NFL, NLI, NNJ, NM, NTX, NV, OH, OK, OR, ORG, SBAR, SC, SD, SDG, SFL, SNJ, STX, SV, TN, VA, VT, WI, WMA, WNY, WWA.

Brass Pounders League
February 1998

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 points or a sum of 100 or more origination and delivery points for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL radiogram format.

Call	*Orig*	*Rcvd*	*Sent*	*Dlvd*	*Total*
W3VR	794	360	1021	39	2214
NM1K	698	286	971	9	1964
W1FYR	0	906	852	2	1760
WBØWNJ	0	249	1115	0	1354
WX4H	3	660	597	13	1273
KT6A	4	635	574	5	1218
N2LTC	7	529	656	24	1125
W7AMM	396	103	524	11	1034
K1TQY	360	483	104	6	953
NØKJ	0	525	633	23	949
W1PEX	1	590	325	2	918
WA9VND	32	471	378	27	908
K9JPS	2	503	36	334	875
W9RCW	1	457	141	223	833
K7BDU	96	312	382	18	808
W6DOB	3	312	379	61	755
KQ4ET	5	350	356	10	721
WB9JSW	0	397	79	274	710
AAØOM	1	325	380	3	705
N5IKN	0	319	147	228	698
KT1Q	0	316	323	6	645
W9IHW	0	324	42	257	623
K4DOR	176	132	308	0	616
K7VVC	22	259	281	4	566
KA2YZM	43	257	209	51	560
N2YJZ	16	252	259	21	548
KA1VEC	15	249	271	7	533
KF1L	4	249	271	6	530
KE4DNO	25	366	516	21	528
K5MC	216	40	251	7	514
KK3F	40	96	336	28	500
NR2F	5	241	243	11	500

BPL for 100 or more originations and deliveries: K4FQU 183, K4SCL 110, N4ZNO 104, WB4GM 102, W4PIM 100.

QST

The World Above 50 MHz

Emil Pocock, W3EP*

Still Room for DX Records

Four new entries have been added to the list of claimed North American terrestrial distance records since they last appeared in this column for April 1996. They are indicated by the asterisks in Table 1. One is an older accomplishment that a participant dug out of his log when he realized he had made a longer contact than that published for 144 MHz auroral E. Take a look at the table and see if you have made a contact longer than any listed. If so, get in touch with Al Ward, W5LUA.

WP4O has reported that he made some contacts into Florida on 222 MHz this past February, one of which will surely fill a gap in the trans-Gulf, Caribbean, and Atlantic tropospheric category. It is likely that there are similar records just waiting to be reported on 903 MHz and higher. The requirement for this category is that the contact link some place on the North American continent via tropospheric propagation with some place not on the continent, such as a Caribbean island.

Three new entries have been added to the claimed world EME distance records, listed in Table 2. These are also indicated by asterisks. All but three of those in the table also qualify as North American records, because at least one participating station was on the continent. W5LUA has no separate listings for the best DX from North America on 432 MHz, 1296 MHz and 10 GHz EME. Would any North American stations like to put in a claim and fill out a North American EME DX table?

The main criterion is that at least one station must be located on the North American continent or adjacent islands on the continental shelf. Separate records might make sense because North Americans will eventually be shut out of the ranks of world EME DX records. The main reason is that from much of North America, the other side of the Earth (20,030 km away, the ultimate DX) lies in the Indian Ocean. Thus, North American DXers are generally limited to distances significantly short of 20,030 km.

This Month

May 3	Good EME conditions
May 9	902/1296/2304-MHz Spring Sprint
May 16-17	50-MHz Spring Sprint
May 31	Good EME conditions

*Send reports to Emil Pocock, Box 100, Lebanon, CT 06249. Leave voice messages at 860-642-4347, or fax 860-594-0259 or e-mail **w3ep@arrl.org**.

Table 1—Claimed North American Distance Records

Compiled by Al Ward, W5LUA, February 1, 1998

Frequency and Mode	Distance (km)	Stations (grid locators)		Date
144 MHz				
Aurora	2,167	WBØDRL (EM18ct)	KA1ZE (FN31tu)	1986 Feb 8
Auroral E	2,236	VE4AQ (EN19lu)	K5MA/1 (FN41qo)	1991 June 9*
FAI	2,370	KXØO (DM78pu)	WA4CHA (EL88qa)	1993 Jun 19
Meteors	3,154	K5UR (EM35wa)	KP4EKG (FK68vg)	1985 Dec 13
Sporadic E	3,495	W7YOZ (CN87vr)	WA4CQG (EM72fo)	1988 Jun 6
TE	6,328	KP4EOR (FK78aj)	LU5DJZ (GF11lu)	1978 Feb 12
Tropo (P)	4,333	KH6HME (BK29go)	W7FI (CN87ws)	1995 Jul 1
Tropo (C)	2,714	WB4MJE (EL94hq)	VE1KG (FN84cm)	1994 Nov 5
Tropo (A)	2,365	W1JSM (FN43nc)	VP5D (FL31ut)	1988 May 10
222 MHz				
Aurora	2,088	WB5LUA (EM13qc)	WC2K (FM29pt)	1989 Mar 13
Meteors	2,050	KØALL (EN16ou)	W1JR (FN42hn)	1988 Aug 13
Sporadic E	1,500	K5UGM (EM12ms)	W5HUQ/4 (EM90gc)	1987 Jun 14
TE	5,905	KP4EOR (FK78aj)	LU7DJZ (GF05rj)	1983 Mar 9
Tropo (P)	4,142	KH6HME (BK29go)	XE2/N6XQ (DL29cx)	1989 Jul 15
Tropo (C)	2,051	K5SW (EM25hr)	W2SZ/1 (FN32kp)	1992 Sep 13
432 MHz				
Aurora	1,902	WB5LUA (EM13qc)	W3IP (FM19pd)	1986 Feb 8
Meteors	1,994	WB5LUA (EM13qc)	KD5RO/2 (FN13fb)	1988 Dec13
Tropo (P)	4,142	KH6HME (BK29go)	XE2/N6XQ (DL29cx)	1989 Jul 15
Tropo (C)	2,204	KM1H (FN42hr)	WB4MJE (EL94hq)	1992 Dec 16
Tropo (A)	2,273	W1RIL (FN42ah)	VP5D (FL31ut)	1988 May 10
903 MHz				
Aurora	87	K3HZO (FM18qp)	WA3NZL (FM19jg)	1991 Nov 8
Tropo (P)	4,061	KH6HME (BK29go)	N6XQ (DM12jr)	1994 Jul 13
Tropo (C)	1,725	WB5LUA (EM13qc)	W4WSR (EL96ww)	1989 Mar 14
1296 MHz				
Tropo (P)	4,142	KH6HME (BK29go)	XE2/N6XQ (DL29cx)	1989 Jul 15
Tropo (C)	2,071	KD5RO (EM13pa)	WB3CZG (FN21ax)	1986 Nov 29
2304 MHz				
Tropo (P)	3,973	KH6HME (BK29go)	N6CA (DM03tr)	1994 Jul 14
Tropo (C)	1,533	WB5LUA (EM13qc)	WA8WZG (EN81om)	1993 Sep 17
3456 MHz				
Tropo (P)	3,973	KH6HME (BK29go)	N6CA (DM03tr)	1991 Jul 28
Tropo (C)	1,352	WB5LUA (EM13qc)	WAØBWE (EN34lx)	1995 Jul 12
5760 MHz				
Tropo (P)	3,973	KH6HME (BK29go)	N6CA (DM03tr)	1991 Jul 29
Tropo (C)	1,187	WB5LUA (EM13qc)	W9ZIH (EN51nv)	1994 Nov 12
10 GHz				
Tropo (C)	1,124	XE2/N6XQ (DL27qo)	WB6CWN (CM96qi)	1994 Aug 25
24 GHz				
Tropo (C)	267	WA6EXV (DM06wl)	K6OW (DM14kf)	1997 Jul 5*
47 GHz				
Tropo (C)	105	K7AUO/7 (CN82pb)	WA3RMX/7 (CN82vw)	1988 Aug 6
76 GHz				
LOS	12.7	WØEOM (CM87uk)	AA6IW (CM87vl)	1997 Dec 11*
120 GHz				
LOS	1.1	WA1MBA (FN32rj)	WB2BYW (FN32rj)	1994 Jul 11
142 GHz				
LOS	3.8	WA1MBA (FN32ri)	WB2BYW (FN32rj)	1993 May 2
241 GHZ (None reported)				
474 THz (Red Light)				
LOS	192.6	WB7VVD (DM34hb)	KC7AED (DM43iq)	1997 Sep 21*
678 THz (Green Light)				
LOS	248	WA7LYI (DM34tf)	KY7B/7 (DM42ok)	1991 Jun 8

Notes: *New listing since April 1996 publication
FAI: E-layer field-aligned irregularities
LOS: Line of sight
Meteors: Meteor scatter
TE: Transequatorial spread-F
Tropo (A): Tropospheric modes across the Atlantic, Caribbean, and Gulf of Mexico
Tropo (C): Tropospheric modes across continental North America
Tropo (P): Tropospheric modes across the Pacific

Interesting possibilities for ultimate DX closer to home include Bermuda to southwestern Australia and Puerto Rico to south China, but contacts from these locations would not qualify as North American records. Still, there is one possibility. Contacts between Amsterdam or St Paul Islands (FT8Z) in the Indian Ocean to central Kansas might just claim an ultimate record—and there are some EMEers out there who make island calls.

US 76 GHz Mark Set

The story of the newest addition to the US record book also includes the first-ever contacts in North America on the 78 GHz band. Lars Karlson, AA6IW, and Will Jensby, WØEOM, made their first attempts last November 28, according to an account that appeared in the January/February issue of *Feed Point*. The pair made a two-way contact over a 4.6 km optical path in Stanford, California. Both stations used harmonic multipliers for transmitting and receiving, a common solution to generating signals at such high frequencies. AA6IW was able to generate about 2 mW this way to an 18 inch reflector antenna, while WØEOM made do with considerably less than 1 mW to a 12 inch dish.

After their initial success, AA6IW and WØEOM made a CW contact at 12.7 km on December 11. Signals were 5 dB above the noise. In the absence of any other claimants, this becomes the new US distance record on the 4 mm band. Congratulations on a tremendous technical achievement! Will and Lars have plans to improve their stations and attempt to extend the distance. They have a worthy goal, as HB9MIO and DK4GD made a 114 km contact on 75 GHz nearly three years ago.

ON THE BANDS

February is normally a slow month for VHF propagation, but not this year. There was a considerable amount of 6-meter DX news, especially along transequatorial paths. An unexpected aurora provided a good deal of excitement over February 17-18, and an early ducting event linked Puerto Rico with the mainland on the evening of February 24-25. Six-meter sporadic E was not dead, but clearly took a back seat to these and other openings. Dates and times are UTC as usual. Thanks to K1CM, KD1DZ, KA2GOJ, K3ZO, AA3GN, WA4LOX, WA5IYX, K9RQ, WØMTK, NØLL, KDØPY, KØSM, LW5EJU, YV4DDK and *Six News* whose useful reports were not otherwise acknowledged in the summaries below.

Six Meter DX

Transequatorial contacts on 50 MHz in the Americas, over the Euro-African path and between Japan and Australia were common during the month. The KP4s were quite busy working many LU, PY and CX stations. Argentines also reported YV4DDK and HI8HGS. Europeans logged 3C5I (Equatorial Guinea), 9G1AA (Ghana), TR8CA (Gabon). Cedric Rourke, CT3FT (EM13) in the Madieras, had many days with TE propagation. He heard the ZD8 beacon often and worked many LU, PY and CX stations, along with ZP5PT. Cedric also hooked up with 3C5I for a new country. During a big opening on February 22, South Africans worked widely throughout Europe, along with 4X (Israel) and 5B4 (Cyprus).

Japanese stations worked Australia and New Zealand on at least a dozen days. JA1VOK reported that he and other stations in east and central Japan hooked up with 9MØC (Spratly Island) on February 14 and 20. Also taking part in western Pacific TE openings were FK1KT (New Caledonia), 9M2TO (West Malaysia), and V73AT (Marshall Islands). There was a bit of true F_2 propagation as well. PY5CC also heard Hawaiian beacons on February 16, 20 and 25, and he had a QSO with WH6XM on the 20th around 2150. PY5CC also worked EH7AH on February 17 around 2220.

Table 2—World EME Distance Records
Compiled by Al Ward, W5LUA, 1998 February 1

Band	Distance (km)	Stations (grid locators)		Date
50 MHz	13,246	ZL2BGJ (RF70dx)	WA4NJP (EM84dg)	1996 Oct 15
144 MHz	19,287	ZS6ALE (KG46rc)	K6MYC/KH6 (BK29ao)	1984 Jul 18
222 MHz	8,154	KH6BFZ (BL11cm)	K1WHS (FN43mj)	1983 Nov 17*
432 MHz	18,970	G3SEK (IO91ip)	ZL3AAD (RE66gr)	1989 Mar 12
902 MHz	2,384	K5JL (EM15dp)	AF1T (FN43ed)	1990 May 27
1296 MHz	18,773	PAØSSB (JO11wi)	ZL3AAD (RE66gr)	1983 Jun 13
2304 MHz	11,029	JA4BLC (PM65nm)	W4HHK (EM55ea)	1994 Sep 24
3456 MHz	8,531	WB5LUA (EM13qc)	DL9EBL (JN69)	1995 Jun 4
5760 MHz	10,246	WB5LUA (EM13qc)	JA7BMB (PM97wm)	1997 Nov 12*
10 GHz	18,340	DJ7FJ (JN48dh)	ZL1GSG (RF72gv)	1997 Mar 12*

*New records

Aurora

The geomagnetic K index registered just 2 on the afternoon of February 17, but stations throughout the Northeast and Midwest were happily running stations via aurora. Only a few contacts were made south of the Ohio River, but stations as far south as North Carolina (EM95), WTØA (EM36), and WØRRY (EM26) in Oklahoma appeared in a few logs. Perhaps the initially low K index misled many operators, as this was a good strong aurora.

Ray Bohmer, W1REZ (FN55), was working stations on 144 MHz as early as 2100 and was still hearing aurora at 0300. He logged 26 grids as far west as KØMQS (EN31) around 1950 km—quite a good distance for aurora. Dick Hart, KØMQS, ran contacts in 35 grids himself, mostly from Minnesota, across the Midwest and as far east as Maine and Maryland. Arliss Thompson, W7XU/Ø (EN13), provided stations as far east as western New York with South Dakota, including WA2AEY (FN23) for his best DX at around 1750 km.

Activity on 50 MHz was at least as widely distributed as that on 144 MHz. In addition to the usual runs of contacts, VE9AA (FN76), K1TOL (FN44), and K1ICM (FN41) copied the VE8BY (FP53) beacon. K1TOL also heard OX3VHF/b (GP60) via auroral E around 0000. The distance was about 2400 km, or just within single-hop range. There was also good activity on the higher bands as well. John Feltz, W9JN (EN54), made 16 QSOs in 14 grids on 222 MHz. Kevin Clark, WA2AEY (FN23) found W9ZIH (EN51), W3EP (FN31), and N8DJB (EN81) on 432 MHz. W3EP also heard W9ZIH, but could not raise him.

Ducting Across the Gulf and Caribbean

Ed Rodriguez, WP4O (FK68), KP4EIT, KP4EOR, KP4SS, KP4PK and possibly other stations on Puerto Rico made a series of great contacts into Florida on 144, 222 and 432 MHz on February 24-25 between 2300 and 0400. Those active on 144 MHz from the Florida side of the opening included W4MOS and KF4FWU (EL97), K4NB (EL96), KF4EJI (EL98) and WA4LOX (EL87). K9NW/C6A (FL15) also made the grade. The contacts between Puerto Rico and the mainland were unusual, but the 1700 to 1900 km range was not especially difficult.

WP4O also hooked up with KF4FWU and WA4LOX on 222 MHz. This may be the first such contacts between Puerto Rico and the mainland, and probably the longest 222 MHz contacts ever made in the Caribbean. WP4O also found W4MOS and KF4FWU on 432 MHz.

These were great contacts, but there is evidence that a Texas-to-Puerto Rico contact (over 3000 km) could have been made that evening as well. While all the excitement was going on over the Caribbean, KB4CRT (EL87) reported 2 meter QSOs with stations along the Alabama and Mississippi coasts. W4WHN (EL94) made it west to WA5JCI (EM21) in east Texas. Finally, Fernando Garcia in his listening post in Monterrey, Mexico, logged numerous high-band television stations in Cuba (channels 9 and 13) and Florida as far east as Miami. Fernando noted similar tropo conditions on February 20 and 21.

Extraordinary Pacific Ducting

The reliable eastern Pacific duct has supported contacts on 144 MHz through 5.6 GHz between Hawaii and the western US coast at distances of 3700 to 4330 km. There has been good reason to think that these distances could be extended, perhaps considerably (see the article in March 1996, pages 41-46). This speculation has recently been given a huge boost by a report from Shel Remington, NI6E (BK29), on Hawaii.

For several years, Shel has been monitoring the FM broadcast band for signs of mainland stations. On February 13, just after 0420, he began hearing a Spanish-language station on 89.5 MHz, which he later concluded must be XHME from Jalisco, Mexico! Within an hour, he found XHPVA (90.3) also from Jalisco and XHMZO (92.9) from Manzanillo. These are Pacific coast cities, about 5200 to 5300 km from Hawaii.

They are surely among the longest reports of tropospheric ducting anywhere in the world, and the implications of this report are obvious. The probable next step is to encourage some dedicated VHF operators along the Mexican West Coast to take advantage of future occurrences of such ducting, as this is probably not a one-time event. Indeed Shel had heard another Mexican FM broadcast station over a three-day period in June 1995.

VHF/UHF/MICROWAVE NEWS

SMIRK Again Urges the Move to 50.2 MHz

The Six Meter International Radio Klub has reiterated its strong support for moving the ordinary 6-meter calling frequency to 50.2 MHz and opening up 50.1 to 50.2 primarily for DX work. Bill Tynan, W3XO, reported the results of the SMIRK board of directors meeting on January

31. Also in attendance were well known 6-meter operators N5TX, K5ZMS, W5OZI, W6JKV and KC5TX. Bill listed seven reasons in support of the plan, summarized here:

1. A DX window helps everyone, especially low-power stations unable to move higher-power stations out of the way.

2. A DX window helps DX stations, because they will not suffer strong QRM from stateside and lower-tier Canadian stations working across the continent.

3. There will be a tremendous increase in 6-meter activity resulting from the large number of new rigs now available. Therefore, the current 25-kHz-wide DX window will be woefully inadequate to support DX and stateside activity that is certain to be present during this solar cycle.

4. In addition to being too narrow, the current 50.100 to 50.125 DX window is also inadequate because a substantial portion of it suffers QRM from TV sets, computers and other electronic devices.

5. A calling frequency at 50.2 makes good sense. Most VHFers are accustomed to the 2 meter calling frequency, 144.2. A similar spot on 6 meters should help alleviate confusion, especially among newcomers.

6. Local, E_s and F_2 transcontinental QSOs will be just as viable above 50.2 as below. Weak-signal F_2 backscatter QSOs may actually be facilitated above 50.2, as they will suffer less QRM from DX stations and others who are trying to work DX.

7. Despite what some may contend, most equipment, including antennas, work just as well near 50.2 as around 50.125.

50.2 MHz in Australia

Six meter operators in Australia (including Eric Jamieson, VK5LP, who writes VHF/UHF—An Expanding World for the Australian journal *Amateur Radio*) have also been promoting 50.2 MHz as the new calling frequency. Eric published a portion of a letter from VK2BA that provides a glimpse of progress in the Southern Hemisphere.

"It concerns me that there are numerous VKs, who are not aware of the new 6M bandplan and the 50.200 MHz calling frequency, continuing to call CQ on 50.110 looking for local DX. It would assist all operators if the word can be passed on to them that they will now do better calling on 50.200. As I observe it, the same stations are heard consistently on 50.110 and they QSY only a small amount and talk to each other regularly. Everyone else has gone to 50.200 and are working up the band from 50.150 to at least 50.280.

"Those hovering around 50.110 seem unaware of the activity up the band. I am finding stations every day that are unaware of the new arrangements and are happy to be informed. Remember that every operator will benefit by having a clear international DX segment when it comes their turn to latch onto something exotic. What is the hangup about moving up the band a little to where the activity is now?"

Feedback

Bob Sohl, W6BYA, provided some additional details of the first US 6 meter F_2 contacts of the current solar cycle, made on December 31 and reported in this column for March. ZL2TPY called Bob on the telephone to say that he was hearing W4DR on SSB in a pileup near 50.120, but could not attract his attention. Bob, in turn, called W4DR on the telephone to tell him what was going on. W4DR then moved to a clear spot near 50.105 and easily made contact with ZL4TPY at 2330. By then, W6BYA had also alerted K6QXY, who made the second contact with ZL2TPY at 2342. ZL2TPY went on to work a string of Texans, as previously reported, all on SSB. QST

W1AW schedule

Pacific	Mtn	Cent	East	Sun	Mon	Tue	Wed	Thu	Fri	Sat
6 am	7 am	8 am	9 am					Fast Code	Slow Code	
7 am	8 am	9 am	10 am					Code Bulletin		
8 am	9 am	10 am	11 am					Teleprinter Bulletin		
9 am	10 am	11 am	noon							
10 am	11 am	noon	1 pm		Visiting Operator Time					
11 am	noon	1 pm	2 pm							
noon	1 pm	2 pm	3 pm							
1 pm	2 pm	3 pm	4 pm	Slow Code	Fast Code	Slow Code	Fast Code	Slow Code	Fast Code	Slow Code
2 pm	3 pm	4 pm	5 pm	Code Bulletin						
3 pm	4 pm	5 pm	6 pm	Teleprinter Bulletin						
4 pm	5 pm	6 pm	7 pm	Fast Code	Slow Code	Fast Code	Slow Code	Fast Code	Slow Code	Fast Code
5 pm	6 pm	7 pm	8 pm	Code Bulletin						
6 pm	7 pm	8 pm	9 pm	Teleprinter Bulletin						
6^{45} pm	7^{45} pm	8^{45} pm	9^{45} pm	Voice Bulletin						
7 pm	8 pm	9 pm	10 pm	Slow Code	Fast Code	Slow Code	Fast Code	Slow Code	Fast Code	Slow Code
8 pm	9 pm	10 pm	11 pm	Code Bulletin						
9 pm	10 pm	11 pm	Mdnte	Teleprinter Bulletin						
9^{45} pm	10^{45} pm	11^{45} pm	12^{45} am	Voice Bulletin						

W1AW's schedule is at the same local time throughout the year. The schedule according to your local time will change if your local time does not have seasonal adjustments that are made at the same time as North American time changes between standard time and daylight time. From the first Sunday in April to the last Sunday in October, UTC = Eastern Time + 4 hours. For the rest of the year, UTC = Eastern Time + 5 hours.

❑ ***Morse code transmissions:***

Frequencies are 1.818, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675 and 147.555 MHz.

Slow Code = practice sent at 5, 7½, 10, 13 and 15 wpm.

Fast Code = practice sent at 35, 30, 25, 20, 15, 13 and 10 wpm.

Code practice text is from the pages of *QST*. The source is given at the beginning of each practice session and alternate speeds within each session. For example, "Text is from July 1992 *QST*, pages 9 and 81," indicates that the plain text is from the article on page 9 and mixed number/letter groups are from page 81.

Code bulletins are sent at 18 wpm.

W1AW qualifying runs are sent on the same frequencies as the Morse code transmissions. West Coast qualifying runs are transmitted on approximately 3.590 MHz by W6OWP, with K6YR as an alternate. At the beginning of each code practice session, the schedule for the next qualifying run is presented. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send it to ARRL for grading. Please include your name, call sign (if any) and complete mailing address. Send a 9×12-inch SASE for a certificate, or a business-size SASE for an endorsement.

❑ ***Teleprinter transmissions:***

Frequencies are 3.625, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz.

Bulletins are sent at 45.45-baud Baudot and 100-baud AMTOR, FEC Mode B. 110-baud ASCII will be sent only as time allows.

On Tuesdays and Saturdays at 6:30 PM Eastern Time, Keplerian elements for many amateur satellites are sent on the regular teleprinter frequencies.

❑ ***Voice transmissions:***

Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59 and 147.555 MHz.

❑ ***Miscellanea:***

On Fridays, UTC, a DX bulletin replaces the regular bulletins.

W1AW is open to visitors during normal operating hours: from 1 PM until 1 AM on Mondays, 9 AM until 1 AM Tuesday through Friday, from 1 PM to 1 AM on Saturdays, and from 3:30 PM to 1 AM on Sundays. FCC licensed amateurs may operate the station from 1 to 4 PM Monday through Saturday. Be sure to bring your current FCC amateur license or a photocopy.

In a communication emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

Headquarters and W1AW are closed on New Year's Day, President's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving and the following Friday, and Christmas Day.

Edited by **Jay Mabey, NUØX** • *Editor,* The ARRL Repeater Directory

Opinions and Anecdotes

Someone once said, "Opinions are like ear lobes, everybody has them." (Yes, I know that another portion of the anatomy is often substituted in this old bromide, but *QST* is a family magazine!) We all like to hold forth on the issues that trouble us. We also enjoy telling stories dear to our hearts.

I'll never pass up an opportunity to rant about things that get under my skin. Take repeater profanity, for example. On too many repeaters these days we're hearing language usually reserved for gatherings in dingy roadside taverns. Do these people truly believe that no one else is listening, or do they simply not care? Hams need to realize that when they speak on a repeater the frequency can be monitored by *anyone* who owns a scanner. What kind of first impression of Amateur Radio are we giving to eavesdroppers who are curious about our hobby? I only hope we don't see the day when some commercial communication lobbyist treats his favorite legislator to a tape-recording made from selected repeater conversations. You think our bands are threatened now...

On another subject, I've received several letters and phone calls asking about the use of 146.52 MHz simplex. For some odd reason hams are becoming confused about the use of .52. It is quite simple: 146.52 MHz is the national FM simplex calling frequency. *Use it!* Many folks call on .52 simplex while traveling to make contact with local hams. Others conscientiously move their repeater conversations to simplex so that their fellow hams can use the machine. (These uncommon individuals deserve medals.) Please remember that the repeater is not the be-all end-all of FM communication. When conditions warrant, go simplex!

And the Winners Are...

In my November 1997 column I challenged you to send essays on topics relating to FM and repeaters. The "prize" was an autographed copy of the 1998-99 *ARRL Repeater Directory*. I received a number of well-written entries, so many that it was impossible to identify a clear "winner." Generous soul that I am, I made the only fair choice possible: I declared *all* entries as winners! Everyone who took the time to put their thoughts to paper will receive copies of the *Repeater Directory*.

Here are just two of the winning epistles...

From CB to FM: A Father's Story

It all started one day at the library in Norfolk, Nebraska, when I was looking for a book on radio. I had owned a CB for years but was interested in what ham radio might have to offer. At the same time I was hoping to find something of interest to my sons—something that might turn into a hobby. Parents know they need something to keep their kids focused, to distract them from all the negative messages they receive today.

My eyes focused on the words "Get your Ham Radio License" on the back edge of a book which turned out to be a copy of *Now You're Talking!* Inside the cover was a sticker advising that the Elkhorn Valley Amateur Radio Club had donated the book. Well, how about that? Here was a local club that we could contact for more information and help in earning a ham license! (Many clubs throughout the country provide their local and regional libraries with updated ARRL publications as part of their club functions.—*Ed.*)

Realizing that I had exactly what I was seeking in my hand, I promptly checked it out. I began to study each evening and fairly soon the kids would ask, "What ya reading, Dad?" I showed them the book and the questions started flowing! The seed had taken root.

I read through *Now You're Talking!* a couple of times, then did a little research to determine where the Elkhorn Valley Club would be giving a license exam. As it turned out, my opportunity was just around the corner at the South Sioux City hamfest. I passed the Technician exam and became KCØAXI.

Before long my son Chris decided to follow my example. While he was still studying we were invited by a local amateur to an Elkhorn Valley ARC meeting. Though we felt a bit awkward, we attended and found that they were a "down home" bunch who made us feel both welcome and relaxed. After the meeting Chris received some additional study materials from the club librarian, a video, and much useful advice and encouragement from the members present. Three weeks later Chris passed his Technician exam on the first try!

So we both had tickets, but no radio. Money was tight, but sometimes a child's best interest must surpass family budgetary constraints. Soon a Kenwood TR-7800 transceiver arrived and it was Christmas all over again for Chris. The rig was installed

Chris Lich, KCØBQI, on the air at last.

and Chris Lich, KCØBQI, and I were officially "on the air." The very first contact was with the amateur who had invited us to the club meeting, and the look on Chris's face will not soon be forgotten!

FM operating is very different from what I recall of CB. Despite what may go on in some areas of the country, our hams uphold high operating standards. This makes FM hamming a pleasure for everyone. I want to thank the members of the Elkhorn Valley ARC for their vision in placing those books (and stickers!) in the Norfolk library. I also appreciate the kindness, friendship and assistance they have provided to my family and me. They put a smile on my son's face and a gleam in his eye that I'm sure will last for years to come.—*Terry D. Lich, KCØAXI, Madison, Nebraska*

Is Ham Radio Going To The Dogs?

My son and his wife live about 50 miles away and the W3ZIC repeater is used for communications between our two families. Second only to Amateur Radio in their hearts is their Australian Shepherd named "Diamond." It seems as though Diamond has developed a fascinating talent. Whenever he hears my call sign on the air, Diamond will bring my son or daughter-in-law to the radio! I know what you're thinking—Diamond is only responding to the sound of my voice. Not so! If he hears *anyone* speaking my call sign on the radio, he acts right away! All other call signs are ignored. Once I was visiting and someone called me at my son's radio. Diamond came and took *me* to the rig!—*Charles Paddock, W8AOO, Masury, Ohio*

Digital Dimension

Stan Horzepa, WA1LOU*

Overcoming Mother Nature, "Nay Sayers" and Murphy!

Last month, Randy Harper, N1NGN, described the super packet radio system of the South Eastern Arizona Radio Society (SEARS). Now he describes how the system keeps on ticking.

In Arizona, we are blessed with many vehicle-accessible high mountains that offer excellent sites for our packet nodes. Designing such nodes requires some imagination, however, when a trip to the site takes 1½ hours—provided the roads aren't closed by snow or rain. Consequently, mountaintop nodes should be reliable. Redundancy and planning are the keys.

Typically, mountaintop nodes are based on standalone TNCs. The system SEARS envisioned requires more horsepower than is available in standalone TNCs, however. Therefore, we use PCs running JNOS software with TNCs in the KISS mode.

Nay sayers said—with extremes in weather, power, and an extensive lightning season—we were doomed to fail. One even suggested that the TEKK KS-900 2 W, 9600 bit/s data radios we chose were "too small to have a very selective front end!" However, this same radio (with an improperly aimed four-element beam) maintained a good 9600 bit/s link to a 7500 foot mountain about 150 miles away!

General Configuration

To describe our mountaintop configuration, I use the SEARS node, but the SEGATE and BISBEE nodes are set up the same way. SEARS uses a Pentium 100-MHz computer running *JNOS* with two COM ports connected to a Kantronics KPC-9612 dual-port TNC and one COM port connected to a 19,200 bit/s LAN with the BISBEE node. Here are the port details:

- *VHFUser* access at 1200 bit/s on 144.93 MHz (uses an Alinco DR-130 radio)
- *UHFUser* access at 9600 bit/s on 438.925 MHz, also a link to the SEGATE Internet gateway (both use 2 W TEKK data radios)
- *BBONE* backbones to the north, east and west at 9600 bit/s
- *220Mail*-forwarding link at 1200 bit/s (uses an older Kenwood radio)
- *LANLAN* connection to BISBEE at 19,200 bit/s

With long electrical lines to the nearest substation and extremes in weather, power drops and brownouts are probable. Therefore, the SEARS node has a 450 W uninterruptible power supply (UPS) to keep the computer running for 30 minutes when the power goes out. In addition, the building housing the SEARS node has a standby power generator that turns itself on and off when it senses a drop or return of main power. The UPS keeps things running during the 30 seconds it takes to get the generator on line. The radios and TNCs use Gel-Cell batteries floating on the 12 V lines from the power supplies. This lessens the possibility of TNCs resetting out of the KISS mode during a power bump.

No Junk

We decided early on, "No junk!" We use only recent-vintage radios with good specifications and shielding. The SEARS mountaintop is jammed with about 300 transmitters. The intermod and interference is incredible, so our equipment must be good enough to deal with the existing interference and not contribute more.

We chose—and swear by—Kantronics KPC-9612 and 9612 Plus TNCs. The dual-port capabilities and "plug and play" operation at 9600 bit/s with the TEKK radios works for us.

We run *JNOS* software on '386DX and faster PCs. Currently, SEARS uses a Pentium 100 MHz computer. While a '386DX33 can do the job, a 486DX66 (or faster) is better, considering the number of ports we run. After nearly two years on the mountain, we have trashed only one motherboard. (It appears that a lightning strike entered through the LAN cable and blasted the computer's memory management unit.) Since then, we've changed the LAN and replaced the '386DX33 with the Pentium (and a 486DX66 next to it, on standby).

The *JNOS* software is very stable and handles the job very well. Its features enhance the system, eg, the ability to do almost everything remotely—including software upgrades. It also provides a warm reboot, dynamic IP and NETROM tables and a SMTP mail server that interfaces with the gateway and other TCP/IP systems.

There is a remote-cold-restart capability in case the system locks up. SEARS maintains the W7DZG 147.020 and 449.525 MHz repeaters, which are next to our packet rack. We connected the repeater controller, via a small relay, to the computer **RESET** switch. This permits us to enter a DTMF command on W7DZG that initiates a cold restart of the node. We've needed to use it just once since we installed this capability.

APRS and More

At present, the SEARS and BISBEE node beacons send APRS-formatted text lines so they can show on the maps of APRS stations. These nodes also digipeat APRS packets, but they are not APRS digipeaters. We are working on a colocated APRS system to relay information from other APRS systems to everyone on the net.

We're also working on image transmission. The idea is to digitize a picture, store it as a JPEG file, transfer it via the TCP/IP ability of the network and display it where needed (eg, at a disaster site, in a hospital or regional HAZMAT office). After suitable encoding, the file can also be sent via AX.25 packets, decoded and displayed.

The Bottom Line

The SEARS system demonstrates that reliable, high-speed digital communications on mountaintops is possible if you don't use junk, plan for the inevitable, and never say never! The proof is that it works!

Check us out from the Internet by telnetting to 198.60.187.235. Leave a message for the Sysop to get a password and you're off and running. If you NETROM connect from another gateway to SEGATE, you need no password. Let us know what you think. QST

*One Glen Ave
Wolcott, CT 06716-1442
e-mail stanzepa@ct2.nai.net
URL: **http://www.tapr.org/~wa1lou**

Strays

"SAFE KID" NET CONTROL

◊ Bryce T. Campain, KD5BTL, age 12, was inspired to start his own FM commuter net after reading "Radios in the Kitchen" by Jock Elliott, KB2GOM, in the August 1997 *QST*. The local newspaper, *The Lawton (Oklahoma) Constitution*, took notice of Bryce's "KD5BTL Commuter Net" and featured a story about it on the front page of their September 14, 1997 edition. Bryce also entered an essay contest, describing his net activities for the 1997 "Safest Kid in Oklahoma" contest. The essay placed third. He submitted the essay to the "Safest Kid in America" national competition and also placed third. As his proud Elmer George Summers, KK5QY, writes, "Not all of our youngsters are headed for juvenile court!"

Edited by **Mary E. Robertson, N7IAL** • Secretary, ARRL Foundation Inc

QSO with the Kernan Kids!

The Kernan Elementary School Amateur Radio Club (KC2AXZ) was a recent recipient of a grant from the Victor C. Clark Youth Incentive Program. This funding has enabled the club to purchase a Cushcraft R-7000 vertical antenna and necessary installation accessories. After it is in place, students will be able to add HF to their station capabilities. Teacher and Club Advisor Don Rankins, N2ZWO, explained:

"Kernan Elementary is an inner-city school in Utica, New York, and the educational home to 600 students, kindergarten through fifth grade. The addition of the radio club two years ago has provided opportunities for club members to improve skills in communications, map reading, computer, English language usage and awareness of space communications systems. Quite honestly, the list of educational opportunities through Amateur Radio is never ending—a fine example of hands-on learning!

"The club has its own secure room that serves as the shack. We presently operate 2-meter voice and packet. The Fort Herkimer Amateur Radio Club has been supportive to the club with technical help and advice. We are thankful to FHARC members for allowing our station the use of the 145.110-MHz repeater each Tuesday and Thursday afternoon for informal nets hosted by the 'Kernan Kids.' I extend my sincere thanks to the ARRL Foundation for its support of our educational endeavors. From the students at Kernan, 73 to all!"

DON RANKINS, N2ZWO

Kernan students are enjoying the spring in central New York and the new HF vertical antenna installed on the roof of the school building.

Planting for Late Summer Blooms

For every one of the past 25 years we've been gratified to note the upswing in contributions that seems to come with blue skies and great weather. Optimism renews at this time of year and generous expressions through many cheerful endeavors seem to abound. Hamming takes on a joy that inspires many to upgrade, pitch in for a walkathon, help a newcomer, or firm up those weeks-before-Field-Day-best-effort-yet plans. We want to take this time to thank all of the many thousands of contributors whose generous gifts, year after year, have meant more scholarships for fall students, ham radio for the first time for new school clubs, and funding to put on exhibits at public events during the summer months. For those who'd like to support such fruitful efforts, your tax-deductible contribution of any size is welcome at: The ARRL Foundation, 225 Main Street, Newington, CT 06111. Questions? Write to me here at ARRL Headquarters, call at 860-594-0230, or e-mail **mrobertson@arrl.org**.

NN3SI Brief

Clarifying the report in March *QST* on page 95, the Smithsonian Institution's station NN3SI, in the Information Age exhibit of the Museum of American History is available for guest operators who make prior arrangements with the station manager. Local volunteers have manned the station since 1976. For further information call 202-357-2700.

Contributor's Corner

We wish to thank the following for their generous contributions to:

The Victor C. Clark Youth Incentive Program Fund
Blossomland ARA (Michigan) in fond memory of Albert K. Rea, W8LRM

The K2TEO Martin J. Green, Sr., Memorial Scholarship Fund
Martin J. Green, Jr., K2PLF

The PHD ARA Scholarship Fund
PHD ARA, Inc. (Missouri) in fond memory of Charles Hensley, KA0OGU

The You've Got A Friend In Pennsylvania Scholarship Fund
Southern Pennsylvania Communications Group (Pennsylvania) in fond memory of Bill Molnar, WA2ORG

The Edmond A. Metzger Scholarship Fund
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Lavonne C. Scanlon, WB6PJY
James J. Pritchard, K2DRA
C. B. Murray, Jr.
Joseph E. Jenkins, KC4RSM
Roman F. Zepeda, XE2EED
Richard A. Derosier, KA1YSI
Mary E. Sproles, KA1VAX
Glenn Sundberg, W6LZB, in fond memory of Walt Barnes, W6IMK
Rudolph R. Rice, K1ROK
Francisco S. Lim, DU4IX
Peter C. Seddon, N1XQK
William A. Cann, W4PUH
Armond F. Rist, W8CSH
Richard J. Chiechomski, PU5WSQ
Roger L. Foust, KE6ZOT
Chris M. Say, KBØVCG
Eric W. Sonnenwald, N2XSE
Meyer Gerstein, W2LG
George E. Mayer, K4HEB
Elihue K. Tate
Leslie A. Werling, WA3NGF
Joseph S. Gorak, N7JPS, in fond memory of John Winters, K9SST
Robert D. Stone, KB9PDQ
Dennis G. Piche, K4QHM
Joseph R. Pasek, KM6JA
Charles E. Kazian, N1XYO
Andrew Miller, N3SKP
John O. Copley, W6MXY
Louis A. Dimasi, W3SMX
Arkansas River Valley AR Foundation (Arkansas) in fond memory of George Andrews, W5PV
Dr. Ehn Oakley
Walter W. McMahan, NØDLF
Rikio Nishioka, KH6ALF
Oklahoma Central VHF ARC (Oklahoma) in fond memory of Jack Muse, WB5ZKZ
Dept. of Health and Mental Hygiene (Maryland) in fond memory of Edward C. Watters, Jr, N3EW
(1) Dade Radio Club of Miami, Inc (Florida) in fond memory of Benjamin Demby, Jr., WA4RQZ
(2) Dade Radio Club of Miami, Inc (Florida)
Michigan Wolverine SSB Net
(Michigan) and Herbert E. Kehlstrom, K8SLE, in fond memory of Albert K. Rea, W8LRM
Philip A. Florig, W9IXX
Earl W. Hocker, WA7MQE
Walter H. Kunz, W7KSM
David P. Forbes, Sr., KC7IJZ
Camille S. Marie, W3EPR
G. B. Hartman, N5TPM
Luis M. Del Moral, WB4RHT
Dennis T. Kelly, K9LJK
Jerry Mulberg, W2MJP
Dr Don-David Lusterman, KB2MUZ
Clark Ross, Jr., KC5MDW
Seabert W. Jordan, Jr., KC8ERH
Louis G. Leonard, WA2UIJ
C.S. Powell, NE9A
Ron Sanelli
James R. and Margory Prine, W5NUI and KB7DLT in fond memory of Patrick J. Hodson, WB5WZU
Samuel F. Pontier, Jr., N6TGU
Rex Beavers, W5SX, in fond memory of James R. Alford, W5AHG

As received and acknowledged during the months of **January** and **February.**

Club Spectrum

Edited by ***Steve Ewald, WV1X*** • *Assistant Field Services Manager*

The Gwinnett ARS Tech Fest

By Kevin Berry, KF4RMA

The Gwinnett Amateur Radio Society held its first *Tech Fest* on Saturday, January 17, 1998. The event began as an on-air discussion about how our club members could go about sharing their wealth of knowledge and experience with one another and our community.

We started the day with our traditional Saturday morning breakfast, albeit a bit earlier than usual. We then proceeded *en masse* to the Central Baptist Church hall, in Lawrenceville, Georgia, where the club holds its regular meetings. Setup activities at the hall included erecting tables for the many ham radio-related technical displays. Meanwhile, Marty Fowler, KE4MLH, was outside directing the installation of the club's portable tower to support HF and2-meter antennas for the event.

The active displays inside included an HF station operated by Karl Phillips, K4GZZ. There was also a 2-meter packet station presented by John Farr, KD6CLO. Howie Gould, W4NVF, set up a rig-check table that included demonstrations on soldering and VOM usage for some hams, and radio test and alignment for others.

Jud Whatley, W4NJZ, lugged in enough antique equipment to give any two hams aching backs! Among the glowing and crackling boxes were some of his original Heathkit and Collins radios. He first used these in the 1950s and all were still in working order! Jud also did a nice job of representing the Quarter Century Wireless Association.

Barry Zoll, N1TOQ, made a valuable presentation about portable generators. He focused on safe electrical and mechanical operation. Barry also provided information about selecting an appropriately sized generator for a given mission.

JOHN SOKOL, K9AOK

Howie Gould, W4NVF (left), helps Gene Gach, KF4NOG, work on his Ten Tec radio at the Gwinnett ARS Tech Fest.

Mike Swiderski, K4HBI, amazed us all with his simple demonstration of SSTV employing two laptop computers, small interface cards built on perfboard (for less than $20) and 2-meter hand-held radios. He handed out how-to instructions for employing this technique on HF as well.

Terry Lewis, KD4KVY, turned what looked like a table full of junk and garbage (including empty soda cans) into inexpensive, and in many cases quite efficient, 2-meter antennas. Rubber ducks couldn't bring up the club's repeater from our ground floor location, but the finished soda can antenna was full-quieting!

Lowry Rouse, KM4Z, ARES District Emergency Coordinator, demonstrated the Automatic Packet Reporting System (APRS) and recruited others to join him as active ARES/SKYWARN hams. Sandy Donahue, W4RU, ARRL Georgia Section Manager, had a great display describing the mission of the League. He provided a considerable amount of information about its activities and services. As a Special Services Club, GARS and its members actively support the ARRL.

Kevin McClure, KF4HFN, used a sophisticated HP network analyzer, borrowed from his cable company employer, to present a revealing demonstration about coaxial cable. Kevin put the feed lines through all manner of stress and strain, and explained the graphic results seen on the instrument. We learned that common insults to our cables (eg, rubbing on a gutter, minor leaks in the casing, small kinks) can have a major impact on performance.

The Tech Fest began at 10 AM and lasted until about 2 PM. When it came time for lunch, there was yet another sharing of knowledge and ability among club members. Many came to the event toting pots of chili and baskets of corn bread. We had a table full of crock pots filled to the brim with chili recipes rated from "QRP" (flavorful, but not too spicy) to "FULL LEGAL LIMIT" and described as "Hotter 'n a black dawg in the July sun!" The fine meal added to the enjoyment and fellowship.

When all was said and done, the GARS repeaters crackled with declarations of complete success and thorough enjoyment. The wheels are already turning for an expanded Tech Fest next year. We expect it to become a popular annual event.

ARRL Special Service Clubs Recognized

Administered by Vicky Armentano

Congratulations to the following ARRL Special Service Clubs (SSCs). This reflects activity from January and February 1998.

Renewing SSCs, January 1998
Athens Radio Club, Inc, GA
Atlanta Radio Club, GA
Amateur Radio Caravan Club, Albuquerque, NM
Broadcast Employees ARS, Inc, New York, NY
Clovis Amateur Radio Pioneers, Fresno, CA
Coconino ARC, Flagstaff, AZ
Corona Norco ARC, GA
Genesis ARC, Inc, South Carver, MA
Gwinnett ARS, Lilburn, GA
Irving ARC, TX
London Bridge ARA, Lake Havasu City, AZ
Marple-Newtown ARC, PA
Mecklenburg ARS, Charlotte, NC
PHD ARA, Liberty, MO
Portland ARC, OR
Richardson Wireless Klub, TX
Sam Houston ARK, Inc, TX
South Bay ARC, Torrance, CA
Twenty Over Nine Radio Club, Inc, Youngstown, OH
Vicksburg ARC, Inc, MS
Whitley Co ARC, Columbia City, IN

New SSC, January 1998
Big Sandy ARC, Louisa, KY

Renewing SSCs, February 1998
Amateur Radio Association of the Tonawandas, North Tonawanda, NY
American Red Cross Emergency Service, Briarwood, NY
Arlington Radio Club, TX
Athens Radio Club, GA
Baton Rouge ARC, LA
Bluegrass ARS, Lexington, KY
Capital City Amateur Radio Club, Helena, MT
Central Ohio Service Weather Network, Columbus, OH
Clark Co ARC, IN
Clover Leaf ARC, Brooksville, FL
Coppell ARC, TX
Dallas-Ft Worth ARC, TX
Fox Cities ARC, Appleton, WI
Lanierland ARC, GA
Milford ARC, OH
Murgas ARC, Wilkes-Barre, PA
Newington ARC, CT
North Hills ARC, Pittsburgh, PA
Oak Ridge ARC, TN
Portage ARC, Inc, OH
Radio Central ARC, St James, NY
Rainbow City ARC, AL
Ripley Co Repeater Association, Batesville, IN
Sandusky Valley ARC, Fremont, OH
San Francisco ARC, CA
Silver Springs Radio Club, Inc, Ocala, FL
Southwest Metro ARTS, Chaska, MN
St Louis ARC, MO
West Park Radiops, Bay Village, OH
Western Washington DX Club, Mercer Island, WA

QST

Coming Conventions

Edited by ***Gail Iannone*** *• Convention Program Manager*

MIDWEST/DAKOTA DIVISION CONVENTION

May 29-30, 1998, South Sioux City, NE

The Midwest/Dakota Division Convention (with Hamboree 20), sponsored by the 3900 Club and the Sooland ARA, will be held at the Marina Inn, 4th and B St. Doors are open Friday noon to 9 PM, Saturday 8 AM to 4:15 PM. Features include flea market (Jeff Marsh, NØWWY, 712-277-3856; **jmarsh@pionet.net**), dealers, exhibitors, VE sessions, forums (MARS, ARRL, technical), special guests Dave Sumner, K1ZZ, and Adrian Weiss, WØRSP, QCWA luncheon, DX card checking, Wouff Hong, ARRL books and display, QRP programs, left foot keying contest, dinner (Friday eve, $9), banquet (Saturday eve, $14), handicapped accessible, free parking, full hookup campground (2 blocks). Talk-in on 146.91. Admission is $6 for both days. Tables are $10 (general area), $15 (perimeter), free electricity. Contact Mike Nickolaus, NFØN, 316 E 32nd St, South Sioux City, NE 68776, 402-494-6070; **nf0n@avalon.net**; **http://www.pionet.net/~k0brd/hamboree**.

ATLANTIC DIVISION/NEW YORK STATE CONVENTION

May 29-31, 1998, Rochester, NY

The Atlantic Division/New York State Convention (64th annual Rochester Hamfest and Computer Show), sponsored by the Rochester ARA, will be held at the Monroe County Fairgrounds, Rte 15A and Calkins Rd in Henrietta. Flea market runs continuously for the entire weekend beginning Friday at 6 AM; exhibits Friday noon, Saturday 8:30 AM to 5:30 PM, Sunday 8:30 AM to 1:30 PM. Features include outdoor flea market with 1200 vendors, 150 indoor exhibitors, up-to-date radio and communications equipment, complete computer systems (components, disks, software, shareware), awards banquet (Friday evening at the Marriott Thruway), full slate of programs (Saturday at the Dome Center), VE sessions (Saturday). Talk-in on 146.88. Admission is $6 in advance, $8 at the door, under 13 free. Tables are $10. Contact Harold Smith, K2HC, 300 White Spruce Blvd, Rochester, NY 14623, 716-424-7184, fax 716-424-7130; **rochfst@frontiernet.net**; **http://www.rochesterhamfest.org**.

1998

April 24-25
Arkansas State, Little Rock*

April 26
Delaware State, New Castle*

May 1-2
Delta Division, Baton Rouge, LA*

May 1-3
International DX, Visalia, CA*

June 12-13
Georgia Section, Albany

June 19-20
Georgia State, Atlanta

*** See April *QST* for details.**

NORTHWESTERN DIVISION CONVENTION

May 29-31, 1998, Seaside, OR

The Northwestern Division Convention (SeaPac), sponsored by the Oregon Tualatin Valley ARC, will be held at the Seaside Convention Center. Doors are open for registration and setup Friday 11 AM to 9 PM; public Saturday 8 AM to 9:30 PM, Sunday 8:30 AM to 2 PM. Features include ARRL Workshop on the new FCC RF exposure regulations by Ed Hare, W1RFI, ARRL Laboratory Supervisor (Friday 1-6 PM), Ladies Hospitality Suite (Room 125), flea market (Lynn Hurd, WB7UNU, 503-624-1999), exhibits (Al Berg, W7SIC, 503-640-5456), seminars and forums, "A Tour of the Universe" (color slide show by Jim Young, W7FTT, and Karen Young, N6PJL), FARS foxhunt, VE sessions (Saturday 9 AM, Our Saviour's Lutheran Church, preregister by May 1, no walk-ins; Dan Sealy, AA7OA, 503-338-3333), banquet (Saturday 7:15 PM, $20; pre-banquet happy hour 6:30 PM; special guest speaker ARRL President Rodney Stafford, W6ROD), self-contained RV parking ($12 per night, 800-444-6740 ext 3), RAGS Country Store (Gene Mielke, KA7JNU, 541-386-2041), refreshments. Talk-in on 146.66. Admission is $6 in advance, $8 at the door; $3 age 13-18 (when accompanied by a registered adult); under 13 free. Tables are $14 per table per day or $20 per table for 2 days. Contact Randy Stimson, KZ7T, 9890 SW Inglewood St, Portland, OR 97225, 503-297-1175; **http://www.easystreet.com/otvarc**.

WEST GULF DIVISION CONVENTION

June 5-7, 1998, Arlington, TX

The West Gulf Division Convention, sponsored by Ham-Com and several Dallas/Fort Worth-area clubs, will be held at the Arlington Convention Center, next door to the ballpark in Arlington and Six Flags Over Texas. Doors are open Friday 5-9 PM, Saturday 7 AM to 5 PM, Sunday 9 AM to 2 PM. Features include indoor and outdoor flea market, vendors, exhibitors, electronics, computers, programs and forums, transmitter hunt, VE sessions, refreshments. Tables are $25 (electrical outlet $36 each). Talk-in on 147.14. Admission is $9. Contact Tom Gentry, K5VOU, Box 861829, Plano, TX 75086, 972-442-1721, fax 972-442-3609; **http://www.hamcom.org**.

Attention Hamfest and Convention Sponsors:

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You're encouraged to register your event with HQ as far in advance as your planning permits. Hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register. Registering dates with ARRL HQ doesn't constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your division director. For conventions, approval must be made by your director and by the executive committee. Application forms can be obtained by writing to or calling the ARRL convention program manager, tel 860-594-0262.

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance. QST

Hamfest Calendar

Edited by ***Gail Iannone*** *• Convention Program Manager*

Attention: The deadline for receipt of items for this column is the **1st of the second month preceding publication date.** For example, your information must arrive at HQ by **May 1** to be listed in the **July** issue. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes or any kind of games of chance such as raffles or bingo.

(Abbreviations: *Spr* = Sponsor, *TI* = Talk-in frequency, *Adm* = Admission.)

Alabama (Moulton)—May 2. Lee Creuzer, N8MHC, 205-351-7916.

California (Livermore)—May 3. *Bill Bradford,* K6YDQ, 510-373-6621.

California (Sacramento/Fair Oaks)—May 31. Bob Naylor, AC6HF, 916-966-3654.

†**Colorado (Loveland)—May 30,** 8 AM to 3 PM. *Spr:* Northern Colorado ARC. Larimer County Fairgrounds, 700 Railroad Ave. Commercial exhibits, computer and radio goodies, VE sessions. *TI:* 145.115 (100 Hz), 146.52. *Adm:* $3, under 12 free. Tables: reserve from Jeanene Gage, NØYHY, 970-351-7327. Michael Robinson, N7MR, 2236 Silver Trails Dr, Fort Collins, CO 80526; 970-282-1167.

†**Connecticut (Newington)—Jun 7;** set up 8 AM; public 9 AM to 1 PM. *Spr:* Newington AR League. Newington High School, Willard Ave (Rte 173). Flea market, new and used equipment dealers, tailgating ($10, 2 parking spots on a first-come, first-served basis), electronics, demos, W1AW open noon to 3 PM (225 Main St), VE sessions (10 AM, no walk-ins), refreshments. *TI:* 145.45, 146.52, 224.84, 443.05. *Adm:* $5. Tables: advance $15 (make check payable to NARL and send with SASE to John DiSarro, KA1HQK, 134 Winslow Dr, Newington, CT 06111), door $20. Ralph Borriello, N1VIM, 706 Lower Ln, Berlin, CT 06037, 860-828-1695; **r.borriello@snet.net**.

†**Connecticut (Vernon)—May 23,** 9 AM to 2 PM. *Spr:* Natchaug ARC. Tolland Agricultural Center, I-84 to Exit 67, follow signs, approximately 1 mile off highway. Flea market, tailgating ($7 per space, includes 1 admission), demos (SSTV, APRS), antique radio display, free parking, refreshments. *TI:* 145.11. *Adm:* $3. Tables: advance $10, door $15. Wayne Rychling, N1GUS, 59 Clint Eldredge Rd, Willington, CT 06279, 860-487-1921; **warych@neca.com**.

Georgia (Statesboro)—May 9. Martin Holzman, WB4MOG, 912-764-5959.

†ARRL Hamfest

Idaho (Caldwell)—May 9. Paul Ferris, KK7DG, 208-467-6340.

†**Illinois (Chicago)—May 24;** set up 6 AM; public 8 AM to 3 PM. *Spr:* Chicago ARC. DeVry Institute of Technology, 3300 N Campbell. Indoor/outdoor flea market, commercial exhibitors, free parking, refreshments. *TI:* 147.255. *Adm:* advance $4, door $5, under 12 free. Tables: $1.50 per ft. George Sopocko, WA9JEZ, 5631 W Irving Park Rd, Chicago, IL 60634; 773-545-3622.

†**Illinois (Decatur)—May 3,** 7 AM to noon. *Spr:* Cenois ARC. Richland Community College, corner of Reas Bridge and Brush College Rds. Flea market, vendors, VE sessions (10 AM). *Adm:* $5 (age 16 and above). Spencer Carter, N9LVW, Box 245, Blue Mound, IL 62513, 217-692-2460, fax 217-692-2424; **N9LVW@msn.com**.

†**Illinois (Princeton)—Jun 7,** 6 AM to 3 PM. *Spr:* Starved Rock RC. Bureau County Fairgrounds, Exit 56 off I-80, S to Rte 6 (Peru St), W ½ mile to Fairgrounds. Free outdoor flea market; 4-H food stand; free parking; no fee for campers, trailers, or electric. *TI:* 146.955 (103.5 Hz). *Adm:* advance $5 (with 4 stubs through May 20), door $6 (with single stub). Tables: $10 (8-ft). Bruce Burton, KU9A, 1153 Union St, Marseilles, IL 61341-1710, 815-795-2201, **brburton@mtco.com**; **http://www.prairienet.org/srrc/**.

†**Indiana (Wabash)—Jun 7,** 6 AM. *Spr:* Wabash County ARC. Wabash County 4-H Fairgrounds, on State Rd 13N. Hamfest/Computer Show, large indoor flea market, outside flea market space ($2), major vendors, overnight camping, refreshments. *TI:* 147.03, 442.325. *Adm:* advance $5, door $6. Tables: $10. Ralph Frank, KB9PLV, 4010 N 700 W, Wabash, IN 46992, 765-833-7372 or 219-563-8487; **http://www.netusa1.net/~qrziota/**.

†**Maine (Hermon)—Jun 6,** 8 AM to 1 PM. *Spr:* Pine State ARC. Hermon High School, I-95 to Exit 44 to US 2, W to High School, follow signs. ARRL forum, section meeting, dealers, tailgating, VE sessions. *TI:* 146.94, 146.52. *Adm:* $3. Roger Dole, KA1TKS, RR 2, Box 730, Bangor, ME 04401; 207-848-3846.

†**Maryland (West Friendship)—May 24**, 8 AM to 2:30 PM. *Spr:* Maryland FM Assn. Howard County Fairgrounds, I-70 to Rte 32, S to Rte 144, turn right, go W on Rte 144, approximately 1 mile to Fairgrounds. Tailgating ($5 per space). *TI:* 146.76, 224.76, 444.0. *Adm:* $5. Tables: advance $20, door $25. FSARC, Box 19, Annapolis Junction, MD 20701, 301-879-2785; **FSARC@aol.com**; John Elgin, WA3MNN, 301-384-6513.

Massachusetts (Cambridge)—May 17. Nick Altenbernd, KA1MQX, 617-253-3776.

†**Massachusetts (Greenfield)—May 11,** Monday evening rain or shine, 6 PM. *Spr:* Franklin County ARC. Wesco Parking Lot on Munson St; take Exit 26 off I-91, go toward Greenfield, take right at first light onto Newton St, go to next intersection and take left onto Munson, hamfest approximately 1 mile on left. Flea market, tailgating, refreshments. *TI:* 146.985 (136.5 Hz), 442.2 (71.9 Hz). *Adm:* $2. Richard Strycharz, KD1XP, 22 Silver Ln, Sunderland, MA 01375; 413-665-6611.

Michigan (Grand Rapids)—Jun 6. Randy Chelette, N8KQX, 616-532-5450.

†**Minnesota (Willmar)—May 16,** 9 AM to 2 PM. *Spr:* Willmar Area Emergency ARC. Willmar Senior High School Cafeteria. Hamfest/Electronics Swapmeet, flea market ($5 per space/table), commercial vendors ($10 for 1 8-ft table or 1 parking space), VE sessions (preregistration required, doors open 7:30 AM, exams 8 AM sharp; walk-ins accepted only if space is available). *TI:* 146.91. *Adm:* advance $4, door $5. Steve Gardner, WBØMAO, 209 Hawaii St NE, Willmar, MN 56201; 320-235-1560 or 320-235-3617; **wØsw@amsat.org**.

†**Mississippi (Pascagoula)—May 22-23;** set up Friday noon; public Friday 5-9 PM; Saturday 8 AM to 3 PM. *Spr:* Jackson County ARC. Jackson County Fairgrounds Civic Center. Dealers, VE sessions (Saturday at noon, $6.35 test fee, no charge for Novice testing; bring photo ID, original license and copy, CSCEs), RV parking available on site, refreshments. *TI:* 145.11, 146.88. *Adm:* $2.50, age 12 and over ($10 max per family). Tables: 8-ft $8 (plus admission; first-come, first-served). Charles (Kim) Kimmerly, N5XGI, 19000 Busby Rd, Vancleave, MS 39565; 228-826-5811.

†**Nebraska (Omaha)—May 3,** 7:30 to 10:30 AM. *Spr:* AK-SAR-BEN ARC. Millard Social Hall, 10508 S 144th St, on Hwy 50, just S of I-80. Ham/Computer Auction (9:30 AM). *TI:* 146.94. *Adm:* Free. Ed Edwards, KØIL, 402-496-3415 or 402-552-5425, **kØusa@qsl.net** or **kØil@qsl.net**; **http://www.qsl.net/kØusa**.

Nebraska (South Sioux City)—May 29-30, Midwest/Dakota Division Convention. See "Coming Conventions."

†**New Jersey (Teaneck)—Jun 6,** 8 AM to 2 PM. *Spr:* Bergen ARA. Fairleigh Dickinson University, Rte 4 E/W to River Rd, follow signs. Flea market ($10 per space, includes admission; limited AC power $20), vendors, VE sessions (8-10 AM, Novice thru Amateur Extra; bring original FCC license, photo copy, positive ID), lots of parking, refreshments. *TI:* 146.79. *Adm:* $5, nonham spouses and children free. Jim Joyce, K2ZO, 286 Ridgewood Blvd N, Westwood, NJ 07675, 201-664-6725; **jjjoyce@cybernex.com**.

†**New York (Goshen)—May 9,** 8 AM to 2 PM. *Spr:* Orange County ARC. John S. Burke Catholic High School, Rte 17 to Exit 122A (Fletcher St), follow signs. Tailgating ($5, weather permitting), SKYWARN Training, ARES/RACES forum, electronics, new and used rigs, components and parts, VE sessions (9-11 AM for Novice and Tech; 11 AM to 2 PM open to all; preregistration advised), free parking, refreshments. *TI:* 146.76 (100 Hz). *Adm:* $5, spouses and kids free. Tables: $10 (we supply table), $7 (you supply table). Ed Moskowitz, N2XJI, 123 Harold Ave, Cornwall, NY 12518-1701; 914-534-3492.

†**New York (Owego)—May 2,** 8 AM to 4 PM. *Spr:* Binghamton ARA. Marvin Park Fairgrounds, take Rte 17 to Owego, go W 2 miles on Rte 17C to park. Indoor and outdoor flea market, tailgating ($2), vendors, exhibits, VE sessions, ARRL forum, refreshments. *TI:* 146.76, 146.52. *Adm:* $5. Tables: $15. William Coleman, N2BC, c/o BARA, Box 853, Binghamton, NY 13902, 607-748-5232; **owego98@ibm.net**; **http://www.wtsn.binghamton.edu/bara**.

†**New York (Queens)—Jun 7;** set up 7:30 AM; public 9 AM to 3 PM. *Spr:* Hall of Science ARC. NY Hall of Science, 47-01 111th St, Flushing Meadow Park. Tailgating, commercial dealers, electronics, computers and software, free VHF tune-up clinic, ARRL information, free parking, refreshments. *TI:* 444.2 (136.5 Hz). *Adm:* buyers $5, sellers $10; under 12 free. Steve Greenbaum, WB2KDG, 85-10 34th Ave, Jackson Heights, NY 11372, 718-898-5599; **wb2kdg@bigfoot.com**.

New York (Rochester)—May 29-31, Atlantic Divison/New York State Convention. See "Coming Conventions."

North Carolina (Durham)—May 23. Rodney Draughon, AE4JW, 336-364-7420.

North Carolina (Gastonia)—May 2. Lynn, KD4CDP, 704-735-2197.

Ohio (Dayton)—May 14-17. Bob Gobrick, NØEB, **rgobrick@worldnet.att.net**. (QRP Conference)

†**Ohio (Dayton)—May 15-17;** Friday 8 AM to 6 PM, Saturday 7 AM to 5 PM, Sunday 7 AM to 2 PM. *Spr:* Dayton ARA. Dayton Hara Arena. Amateur Radio and Electronics Show, giant outdoor flea market (advance only, fax 937-276-8902, **fleamkt@ hamvention.org**), inside exhibit booths (fax 937-376-4648, **exhibits@hamvention.org**), vendors, forums, VE sessions (reservations recommended, walk-ins accepted), Grand Banquet (Saturday 6 PM, Nutter Center; advance $30, includes Ronnie Milsap, WB4KCG, in concert, door $35), special-event station, camping, handicapped services, free parking. *TI:* 146.94. *Adm:* advance $15, door $20 (good all 3 days). Dick Miller, N8CBU, Box 964, Dayton, OH 45401-0964, 937-276-6930 or 937-427-3109; **chair@hamvention.org**; **http://www.hamvention .org**.

†**Ohio (Medina)—Jun 7;** set up 6:30 AM; public 8 AM to 3 PM. *Spr:* Medina Two Meter Group. Medina County Fairgrounds Community Center, 735 Lafayette Rd, State Rte 42 S out of downtown Medina to Fairgrounds. Outdoor flea market (advance $7, door $8 per space), vendors, new and used ham gear, computer equipment, VE sessions (330-725-0119, walk-ins welcome), free parking, refreshments. *TI:* 147.03. *Adm:* advance $4, door $5. Tables: advance $9, door $10. Mike Rubaszewski, N8TZY, 4264 Alpine Hill Ct, Brunswick, OH 44212; 330-273-1519.

Oregon (Seaside)—May 29-31, Northwestern Division Convention. See "Coming Conventions."

†**Pennsylvania (Pittsburgh/Butler)—Jun 7,** 8 AM to 4 PM. *Spr:* Breezeshooters ARC. Butler Farm Showgrounds, PA Rte 68, W of Butler. Hamfest/Computer Show, tailgating ($5 per space). *TI:* 147.36, 146.52. *Adm:* $5. Tables: $15 (George Artnak, 412-854-5593; **geoart@usa.net**). Larry Polesnak, WB3KJG, Box 101035, Pittsburgh, PA 15237, 412-367-7933; **http://www.users.sgi.net/~wolfie/**.

Quebec (Montreal)—Jun 6. James Hay, VE2VE, 514-697-7205.

Quebec (Sorel-Tracy)—May 31. Jean Gadoury, VE2UL, Box 533, Sorel, Quebec, Canada J3P 5N6.

Rhode Island (Forestdale)—May 16. Rick Fairweather, K1KYI, 401-725-7507.

†**Tennessee (Nashville)—Jun 6,** 8 AM to 4 PM. *Spr:* Nashville ARC. Tennessee State Fairgrounds. *Adm:* $5. Bob Malone, WB5ZDS, 258 Emmitt Ave, Madison, TN 37115; 615-865-6225.

Texas (Arlington)—Jun 5-7, West Gulf Divison Convention. See "Coming Conventions."

Texas (Hondo)—May 16. Dallas Davis, KC5JIM, 830-538-2107.

†**Virginia (Manassas)—Jun 7,** 7 AM to 3 PM. *Spr:* Ole Virginia Hams ARC. Prince William County Fairgrounds. Tailgating ($5 per space), handicapped accessible, refreshments. *TI:* 146.97, 224.66. *Adm:* $5. Mary Lu Blasdell, KB4EFP, 9727 Loudon Ave, Manassas, VA 20109; 703-369-2877.

†**Washington (Dryden/Wenatchee)—Jun 5-7.** *Spr:* Apple City ARC. Dryden Gun Club, bottom of Blewett Pass at junction of Highways 2 and 97, follow signs. Dealers, VE sessions, self-contained RV camping, refreshments. *TI:* 146.68 (156.7 Hz), 146.52. *Adm:* $5. Tables: Free. Greg Johnson, WA7TSP, Box 4427, Wenatchee, WA 98807, 509-663-1081; **g.c.johnson@mail.sprint.com**.

†**Wisconsin (Junction City)—Jun 7;** set up Saturday evening (overnight security), Sunday 6:30 AM; public 8 AM to 1:30 PM. *Spr:* Central Wisconsin Radio Amateurs. US Army Reserve Center. Swapfest/Auction, tailgating, vendors (electrical power available on first-come, first-served basis), VE sessions, meetings (WI Net Assn, WI Packet Radio Group, QCWA Chapter No 174, Badger Contesters), free parking, refreshments. *TI:* 146.67. *Adm:* $3, under 12 free. Tables: $4 (before May 15), $7 (after May 15, plus admission). John Feltz, W9JN, 973 East First St, Junction City, WI 54443-9614, 715-457-2506; **jfw9jn@tznet.com**.

†**Wyoming (Rawlins)—May 23-24;** Saturday 9 AM to 5 PM, Sunday 9 AM to 3 PM. *Spr:* Carbon County ARS. Jeffry Convention Center, Third and Spruce. VE sessions. *TI:* 146.76, 147.24. *Adm:* advance $5, door $7. Ken Fults, KC7RZI, 101 E Miller, Rawlins, WY 82301; 307-324-6067.

Attention All Hamfest Committees!

Get official ARRL sanction for your event and receive special benefits such as free prizes, handouts, and other support. If you are an affiliated club, you are also entitled to receive a 10% commission on sales of League publications!

It's easy to become sanctioned. Contact the Convention and Hamfest Branch at ARRL Headquarters, 225 Main St, Newington, CT 06111. Or send e-mail to **giannone@arrl.org**. QST

Silent Keys

By Kathy Capodicasa, N1GZO

It is with deep regret that we record the passing of these amateurs:

W1ACB, Charles F. Anderson, Quincy, MA
*W1BPI, Alexander A. Mckenzie, Rosemont, PA
AA1DG, Roger A. Blaisdell, Sagamore Beach, MA
KA1DU, Richard C. McCurdy, Darien, CT
W1DWY, Edwin F. Dillaby, Beverly, MA
K1FOG, George E. Syriac, Southbridge, MA
WA1GQL, J. G. Ingham, Venice, FL
W1HBH, Robert S. Katson, Manhattan Beach, CA
W1JVQ, Albert Kaufman, Trumbull, CT
N1LQW, Donald A. MacLean, Bridgeport, CT
KA1MEO, John Kranak, Acton, MA
W1QNM, Warren C. Chase, Fort Myers, FL
W1SYG, Joseph M. Sebas Jr, Stratford, CT
W1TZM, George P. Faour Sr, Essex Junction, VT
W1UXK, Arthur W. Rogerson, Heathsville, VA
K1YJD, George G. Preston, South Hamilton, MA
WA1YKR, Edmond C. Loyot, Middlebury, CT
K1ZAC, Robert E. Potter, Lawrence, MA
W2DB, H. T. Cervantes, Inverness, FL
N2DED, Madalyn L. Bassette, Interlaken, NY
WB2DMW, Sylvester Beganskas, North Rose, NY
W2IAO, David Greene, Boca Raton, FL
N2LGA, Wes Parke, Freehold, NJ
N2LHN, Fred R. Wagner, Parlin, NJ
WA2OOP, Laurence J. Test, Haddonfield, NJ
WA2PJX, Roger Nunn, Succasunna, NJ
K2RGY, George W. Bond, Grantham, NH
W3GJF, John D. Llopes, Jefferson City, TN
K3GML, William R. Dunlap, New Brighton, PA
W3KQJ, John A. Ditton Jr, Berwyn, PA
N3NJZ, Daniel D. Shelby, Kensington, MD
N3PAB, Henry R. Coates, Ellicott City, MD
N3TZE, Edwin J. Colerick, Catonsville, MD
N3VVJ, John F. Medved, Springdale, PA
WB4ARS, Conrad W. Kibler, Tampa, FL
KD4BFF, Clyde V. Starling Jr, Kenly, NC
N4FSF, Richard W. Stasik, Ocala, FL
WA4HVU, Walter D. Johnson, Winchester, VA
WB4HZB, Herbert L. Gatchell, Merritt Island, FL
K4ICB, Raymond M. Kemper, Sarasota, FL
KC4IDU, John W. Sprock, Saint Petersburg, FL
K4IEP, J. C. Jordan Jr, Winston Salem, NC
KR4LV, Gerald W. Osborne, Lillian, AL
WE4M, James Maglione, Venice, FL
W4OMY, Glenn Andrews, North Palm Beach, FL
*WA4ONQ, Julian F. Kaufman Jr, Brunswick, GA
W4PFQ, John R. Henry, Belleview, FL
W4QCA, W. C. Ingersoll, North Palm Beach, FL
N4RAB, Lynda Ames, New Market, VA
W4RK, Robert F. Brady, Atlanta, GA
KO4RU, Frank H. Shorkley, Cape Coral, FL
*KB4SM, Benjamin S. Hale, Morrilton, AR
W4VQW, Dan H. Wicker, Tampa, FL
KA4WYH, Wes Ellison, Holly Hill, FL
KE4XZ, Ralph A. Welsh, Walhalla, SC
W4YWP, Walter S. Gibson Ret, Albany, GA
K5AP, Harold H. Bernhard, El Paso, TX
W5DRI, Dena G. Morgan, Brookhaven, MS
WB5LUX, Everett J. Meyer, Enid, OK
W5RBJ, William P. Profrock Jr, Montgomery, TX
KB5TLO, Wesley Norman, Petal, MS
AF5W, LeRoy Milliren, Springdale, AR
W6ALF, Raymond F. Kramer, Manhattan Beach, CA
W6ANX, Theron M. Woods, Auburn, CA
WD6CWM, Charles T. Kerrin, Escondido, CA
N6DAD, Marjorie J. Howard, San Diego, CA
KA6GWZ, William Poynter, Covina, CA
W6IMK, Walthew T. Barnes, San Gabriel, CA
*WA6JKQ, Jerome J. Curtis Jr, Sacramento, CA
WB6JMW, Isaac "Ike" Jones, Mayer, AZ
*W6KHY, Myer L. Crumb, San Luis Obispo, CA
N6PG, Paul N. Garrotto, Marina, CA
W6TOF, Richard G. Towns, Apple Valley, CA
W6UHA, Maxine E. Willis, Grants Pass, OR
KB6VGF, Howard R. Lewis, El Cajon, CA
KB6WWB, Nathan Landsberg, Los Angeles, CA
W7BDL, Ellis W. Call, Pocatello, ID
K7BOT, A. Arant, Medford, OR
W7BQE, Lloyd C. Peterson, Sidney, MT
W7BTV, Eugene H. Dodge, Gig Harbor, WA
N7BYS, Emmitt R. Boone, Federal Way, WA
W7EDS, Beth W. Bangerter, Bountiful, UT
K7IKR, Francis Longo, Santa Maria, CA
W7OTJ, William G. Hammond, Fishtail, MT
WA7TIX, Valory R. Roskelley, Tempe, AZ
W7TRH, Malvin C. Ball, The Dalles, OR
KA7WJJ, Esther M. Switzer, Sun Lakes, AZ
W8CAE, John C. Chenoweth, Miamisburg, OH
N8CPD, Charles M. Ecker, Creston, OH
KC8CYV, John W. Cushing, Mount Orab, OH
WD8DGH, George W. Rowe, N Fort Myers, FL
W8DV, Donald E. Viel, Middletown, OH
WA8EDH, Charles W. Miller, Columbus, OH
W8HJF, Edgar T. Pennington, Lima, OH
WD8IPJ, Don Gullett, Clearwater, FL
W8JAO, Paul E. Stockman, Owensville, OH
W8KHA, Clement W. Wolf, Harrison Township, MI
W8LHY, Herbert P. Mallon, Canton, OH
W8LRM, Albert K. Rea, Saint Joseph, MI
N8LVQ, Clarence A. Hendrickson, Stambaugh, MI
W8NJJ, Floyd J. Ryel, Warren, OH
K8PPC, Glenn E. Rodway, Youngstown, OH
K8THT, Philip E. Winters, Cincinnati, OH
*WA8YNF, Ernest F. Meadows, Wellston, OH
W9ACU, Francis Walton, Browning, IL
W9EOB, Robert R. Bell, Milwaukee, WI
W9GIW, Howard P. McCormick, Springfield, IL
W9HOT, Adrian Z. Hodson, Greenville, IL
K9ILG, Harold L. Broadstreet, Mooresville, IN
*W9KGE, Marvin G. Baker, Indianapolis, IN
KB9LAO, Jesse L. Hildreth, Dixmoor, IL
N9RCW, Darrel H. Lony, Edwardsville, IL
KA9RWM, Marion Hook, Moline, IL
*W9TY, William E. Degeer, Gary, IN
K9UGC, James M. Crooks, Madison, WI
*WB9UQT, James H. Decker, Baraboo, WI
WE9U, Gerard E. Kelly, Houston, TX
K9VWM, Preston H. Kidd, Springfield, IL
K9WWJ, Harold A. Shaft, Bluffton, IN
WØGWJ, Roy H. Aukes, Steen, MN
NØGXC, George Schlueter, Hills, MN
WQØH, Jack C. Wells Jr, Colorado Springs, CO
AAØIO, Charles R. Allen, Saint Louis, MO
KBØLUH, Frances M. Plankinton, Horton, KS
NØMFJ, Emil J. Van Sickle, Junction City, KS
WØOQQ, Arthur L. Exe, Frenchtown, MT
NØOWA, Leo A. Hanke Jr, Overland Park, KS
WØQLU, Kenneth L. Roland, Cedar Rapids, IA
DL1JW, Hubert Esser, Bad Kreuzn, Germany
*I4AMO, Triestino Goldoni, Mirandola, Italy
LA5FJ, Steinar Helbo, Brarud, Norway
*VA3HN, Henry H. Rugg, St. Catharines, PQ, Canada
VE3BIX, Ernest C. Reid, Burlington, ON, Canada
VE3FYW, Fred H. Western, Beaverton, ON, Canada

*Life Member, ARRL

Note: Silent Key reports must confirm the death by one of the following means: a letter or note from a family member, a copy of a newspaper obituary notice, a copy of the death certificate, or a letter from the family lawyer or the executor. Please be sure to include the amateur's name, address and call sign. Allow several months for the listing to appear in this column.

Many hams remember a Silent Key with a memorial contribution to the ARRL Foundation. If you wish to make a contribution in a friend or relative's memory, you can designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund, or the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation Inc, 225 Main St, Newington, CT 06111.

QST

75, 50 and 25 Years Ago

May 1923

◊ "The Main 'Guy'," on the cover by Clyde Darr, 8ZZ, shows a rather hefty ham leaning against the guy wire holding up a mast that is being planted in the ground. The lead editorial, "How Cum," bemoans the fact that some hams still defend spark sets, despite the fact that "the spark must go, and there is no use blinking at that fact."

"Multiple-Tuned Antennas" describes the Alexanderson multiple-tuned antenna, designed for locations where a low-resistance ground is impossible—L. C. Young, NSF-NOF, writes about "Multiple Tuning the Long Low Antenna"; H. H. Newell, 1YK, describes "The Multiple-Tuned Roof Antenna at 1YK"; and Lynne Smeby, 9AUL, tells about "Working down to 100 Meters by Multiple Tuning." Albert Murray discusses "How to Measure Antenna Resistance and Capacity." Antennas are the featured subject for most of the articles in this issue, with a bit of humor supplied by Adaire Garmhausen, 3BCK, in his article "The Perfect Aerial."

May 1948

◊ The cover photo shows the HQ Lab testing a new rig that delivers 200 watts output on 225 Mc. The exciter is described in the article "Crystal Control on 220 Mc.", with an article promised in the near future to describe the buffer-amplifier. The editorial discusses the growing problem hams are having with TVI, now that TV broadcasting is catching on."What about Single Sideband," by Donald Norgaard, W2KUJ, discusses the advantages of SSB over AM. Richard Smith, W1FTX, describes "A Beginner's C.W. Transmitter," running 40 watts input with crystal control. Phil Rand, W1DBM, insists that "TVI Can Be Reduced," showing techniques that he has developed. Adelbert Kelley, W2VSX, tells about his rig that runs "Thirty Watts—Mobile" on 10 meters. An amusing photo in Ed Tilton, W1HDQ's, "The World Above 50 Mc." column shows W1FLQ's shack being moved to a new location. W1FLQ had built the structure inside the base of a windmill tower that held up his antennas, so a very large crane just picked up the windmill tower, shack and all, and set it down on the new foundation!

May 1973

◊ The cover shows the rig that makes "state of the art come to the builder of homemade solid-state gear," with Part I of "A Medium-Power HF SSB/CW Transmitter" as the issue's lead article. The editorial recognizes the vast contributions of the League volunteer leaders, and discusses the grooming of the newcomers of today to become the leaders of the future.

Ki Negoro, WN6QJP, tells about "An Antenna Changeover System and Power-Output Indicator" that will be of interest to the new Novice. Peter Grillo, W9LVT/6, describes "A Practical 40-Meter Quad" that will help make your Field Day signal a big one. "Range Measurements with Oscar 6," by Karl Meinzer, DJ4ZC, tells how to use SSTV equipment to determine satellite orbital parameters. In "The Case for Minimal Regulation," ARRL President Harry Dannals, W2TUK, tells a meeting of the Washington QCWA chapter why restrictive rules inhibit growth and stifle public service in Amateur Radio.—*Al Brogdon, W1AB (with tnx to Jay O'Brien, W6GO, and his library of* QSTs) QST

Contest Corral

*Edited by **Bev Fernandez, N1NAV** • Assistant Contest Manager*

Looking for your Field Day Package? The official entry forms, rules, and everything else you could ever want to know about Field Day are available on the ARRL Web site (**http://www.arrl.org**) or in the **1998** *ARRL Contest Yearbook*. Don't spend your Field Day in the dark—get your copy now! ARRL Publications are available from your local ARRL dealer or directly from ARRL. See the ARRL Bookcase ad elsewhere in this issue for ordering information or check out the full ARRL publications line on the World Wide Web.

Spring is here! What better way to work on your code speed before Field Day than with a Qualifying Run? W1AW Qualifying Runs are 10 PM Monday, May 4th; and 9 AM Thursday, May 21st. The West Coast Qualifying Run will be at 9 PM on Wednesday, May 6th. Check the W1AW schedule for details.

Feedback

JH7PKU was not listed in the 1997 IARU HF World Championship results. This was a multiop with JM1CAX and JO1BMV. Their score was 847,873. The S5ØU multiop score was also not listed. S5ØU and S5ØR had a score of 1,039,500. In the 1997 ARRL International DX Contest W4NTI operated 40 meters only. This put him in first place in Alabama for 40 meters.

May

2-3

ARI International DX Contest, sponsored by the Associazione Radioamtori Italiani, from 2000Z May 2 until 2000Z May 3. 10 15 20 40 80 160 meters (no RTTY on 160 m). Single op CW/phone/RTTY/mixed mode; multi-single (mixed mode only). Once on a band or mode, you must remain there for 10 min. Everybody works everybody. Send RS(T) and serial no.; Italian stations send RS(T) and two-letter province identifier. Score 1 pt/QSO w/different countries on own continent; 3 pts/QSO w/different continent; and 10 pts/QSO w/I or IS stations. Work stations once per band and mode; multipliers count once per band. Stations in your own country may be worked for multiplier credit only. Final score is QSO pts × Italian provinces (max 103) and DXCC countries (except I and IS0) per band. Awards. Electronic entries accepted. Send logs within 30 days to ARI Contest Manager, Paolo Cortese, I2UIY, POB 14, I-27043, Broni (PV) Italy; e-mail **i2uiy@contesting.com**.

Connecticut QSO Party, sponsored by the Candlewood ARA, from 2000Z May 2 until 2000Z May 3, with a rest period from 0400-1200Z. Phone, CW and RTTY. Work stations once per band and mode, mobiles as they cross county lines. No repeater QSOs. Single op, fixed/mobile; Novice; QRP (<5W); multi-single, multi-multi and CT clubs. Send RS(T) and state/province/DXCC country; CT stations send county. Score 1 pt/phone or RTTY QSO; 2 pts/CW QSO; and 5 pts/W1AW or W1QI QSO. Final score is QSO pts × CT counties; CT stations use CT counties/states/provinces plus 1 multiplier for DX. CW—40 kHz up; Novices—25 kHz up; phone—1.860 3.915 7.280 14.280 21.380 28.380; VHF—50.150 144.200 146.58. Awards. Send logs by Jun 3 to CARA, POB 3441, Danbury CT 06813-3441.

Danish SSTV Contest, sponsored by the Danish SSTV Group, from 0000Z May 2 to 2400Z May 3. 80 40 20 15 10 6 2 meters. Score 2 pts for the first QSO with a DXCC country, 1 pt for each additional contact, and 1 bonus pt for QSOs with OZ stations. Work stations once per band. Send logs postmarked by Jun 4 to Carl Emkjer, Soborghus Park 8, DK 2860, Soborg, Denmark.

MARAC County Hunters CW Contest, sponsored by the Mobile Amateur Radio Awards Club, from 0000Z May 2 until 2400Z May 3. CW only. Fixed, portable and mobile classes. Work fixed stations once/band, mobiles/portables as they change county. Mobiles on county lines count as 1 QSO but multiple multipliers. Mobiles sign/M; portables sign /P. Only one transmitted signal at a time. 3.575 7.040 14.050 21.050 28.050. Send RST, county and state or province/DXCC country. Score 1 pt/QSO w/fixed W/VE stations; 5 pts/QSO w/DX stations; and 15 pts/QSO w/portable or mobile stations. Stations operating under a net control are invalid for contest purposes. Final score is QSO pts × US counties worked. Awards. Send logs by Jun 5 to Norm Beavers, W3DYA, 3320 McMillan Dr, Tyler, TX 75701-8239.

Massachusetts QSO Party, sponsored by the Framingham ARA, from 1800Z May 2 until 0400Z May 3 and 1100-2100Z May 3. Work stations once per band and mode. Classes: outside MA; MA single op; MA multiop; MA portable; MA team (5 MA single ops); MA Novice/Tech; MA club. Send RS(T) and state/province/DXCC country/MA county. Score 1 pt/phone and 2 pts/CW/digital/video QSO. Final score is QSO pts × MA counties (max 14)/band; MA stations use MA counties + states/provinces/DXCC countries. CW—1.810 3.550 7.050 14.050 21.050 28.050; phone—1.850 3.890 7.290 14.270 21.390 28.390 144.220-SSB 146.550-FM 432.150-SSB 446.000-FM; Novice—3.705 7.130 21.130 28.130. Awards. Send logs by Jun 6 to FARA, POB 3005, Framingham, MA 01701; **n1tyh@aol.com**; **http://www.fara.org/~fara/.**

Ten-Ten International Net Spring CW QSO Party, sponsored by Ten-Ten International, from 0000Z May 2 until 2400Z May 3. CW only, 10 meters only. Single op, club or QRP categories. Send call, name, state/country and 10-10 number (if member). Score 1 pt/QSO w/non-members, 2 pts/QSO w/US members and 3pts/QSO with DX. Final score is total QSO pts. Send logs by May 25 to Possum Trot Chapter, c/o Bill Kelchner, KU4W, 9946 Rockfish Rd, Raeford, NC 28376.

9-10

ARRL VHF/UHF Spring Sprint, 902/1296/2304 MHz, see Apr *QST*, p 102.

CQ-M International DX Contest, sponsored by Krenkel Central RC of Russia, 2100Z May 9 to 2100Z May 10. CW, Phone, SSTV, 160 to 10 meters plus satellites. Categories: Single op-single band CW, SSB, mixed mode or satellites; single op, multiband CW, SSB, mixed mode or QRP (mixed mode, <5 W); multi-single (multiband, mixed mode); SWL or WWII veteran (multiband, mixed mode); SSTV (single or multiop, multiband, SSTV only). Change bands only once per 10 minutes. Work stations once per band, regardless of mode. Exchange RST and serial no. Scoring 1pt/QSO with own P-150-C country, 2pt/QSO with another P-150-C country, 3pt/QSO with another continent. Multipliers: Each country in the P-150-C award country list counts as a multiplier only once per band. Final score is the sum of all QSO points, plus sum of all multipliers. Awards. Send logs by Jul 1 to CQ-M Contest Committee, Krenkel Central Radio Club of Russia, Box 88, Moscow, Russia; **cqm98@mai.ru**; **http://www.mai.ru/~crc/cq-m/cqmain_e.htm**.

Fists CW Club Spring Sprint, sponsored by Fists International CW Club, 1700-2100Z May 9. CW only, work stations once per band. 3.5 7 14 21 and 28 MHz. Exchange name, state/province/DXCC country and Fists number if member or power output if non-member. 5 pts/QSO with Fists member, 2 pts/QSO with non-members and 10 pts/QSO with Fists Novice or Tech Plus members. Final score equals QSO points times states, provinces (once for each) or DXCC countries (each time worked). QRP and QRO categories. Send logs by Jun 15 to Tom Waits, AC5JH, 4346 Rose Garden Cir, Zachary LA 70791; **http://www.fists.org/.**

Indiana QSO Party, sponsored by Land O' Lakes ARC, 1400Z May 9 to 2300Z May 10. Single op, multiop, club station, VHF/UHF; any class can be fixed and/or mobile. Exchange signal report and county for Indiana stations, signal report and state or county for others. Work stations once per band and mode; work mobiles in each county. 2 pts for SSB and AM contacts, all other modes count 3 pts. Multipliers: Indiana stations multiply QSO points by total of Indiana counties, states and countries worked. Out of state stations multiply QSO pts by the number of Indiana counties worked (max 92). No repeater QSOs. CW: 1.810 3.539 7.035 7.115 14.035 21.120 28.040. Phone: 1.860 3.890 7.280 14.285 21.385 28.585 50.14 144.215. Awards. Send logs by Jun 12 to, Sharon Brown, 905 W Parkway Dr, Pleasant Lake, IN 46779; **wnbrown@dmci.net**.

Nevada QSO Party, sponsored by the Frontier ARS, 0000Z May 9 until 0600Z May 10. 160-6 meters, SSB/CW/RTTY. Work stations once per band/mode. Send RS(T) and state/province/DXCC country; NV stations send county. CW—15 kHz up in General; SSB—25 kHz up; Novice/Tech Plus—25 kHz up. Score 2 pts/CW or RTTY QSO and 1 pt/SSB QSO. Final score is QSO pts × NV counties (NV stations use states/provinces/DXCC countries). Awards. Send logs by Jun 15 to Jim Frye, NW7O, 4120 Oakhill Ave, Las Vegas, NV 89121-6319; **nw7o@tcd.net**.

Oregon QSO Party, sponsored by the Central Oregon DX Club, 0000Z May 9 to 2400Z May 10. OR stations work everyone. Others work OR stations only. Work stations once per band/mode, mobiles again as they cross county lines. CW: 1.810 3.540 7.035 7.125 14.035 21.035 21.125 28.035 28.125; phone: 1.855 3.905 7.280 14.280 21.380 28.580; VHF: 50.125 145.025 146.55. No repeater QSOs. 1 pt/SSB QSO; 2 pts/CW QSO. OR stations multiply QSO pts by OR counties/states/provinces/DXCC countries; others multiply by OR counties worked (max 36). Add 50 bonus pts for working two stations in Deschutes County and another 100 bonus points for working a third station in Deschutes County; add 200 bonus points for working club station K7ZZZ. Awards. Send logs by Jun 30 to OR QSO Party, c/o CODXC, K7ZZZ, 19821 Ponderosa St, Bend, OR 97702.

16

ARRL VHF/UHF Spring Sprint, 50 MHz, see Apr *QST*, p 102.

EU Spring Sprint, CW, 1500-1900Z May 16. Work EU stations only. 80, 40 and 20 meters. Send your call sign, other station's call sign, serial no. and name or nickname. QSY rule: Stations calling CQ, QRZ, etc may only work one station in response to that call; they must then move at least 2 kHz before working another station or before soliciting another call. Once you are required to QSY, you may not make a new QSO on the previous frequency until you have made a contact at least 2 kHz away. Final score is the number of QSOs. Send logs to Bernhard Buettner, DL6RAI, Schmidweg 17, 85609 Dornach, Germany; email **eusprint@dl6rai.muc.de**; **http://www.rrze.uni-erlangen.de/~unrz45/bcc**.

23-24

ARCI QRP Hoot Owl Sprint, CW, sponsored by QRP ARC International, from 2000 until 2400 local time May 24. Categories: single band, all band, high band (20 15 10 m), low band (160 80 40 m).Work stations once per band. Send signal report, state/province/DXCC country and QRP ARCI number if member (non-members send power output). 1.830 3.560 3.710 7.040 7.110 14.060 21.060 21.110 28.060 28.110 50.060. Count 5 pts/QSO

with ARCI member. Others count 2 pts/same continent and 4 pts/different continent. Multiply QSO points by states/provinces/DXCC countries worked per band and by power multiplier (>5 W (1; <5 W (7; < 1 W (10; < 250 mW, (15). Awards. Mail entries by Jun 23 to QRP ARCI Contest Manager, Cam Hartford, N6GA, 1959 Bridgeport Ave, Claremont, CA 91711; **CamQRP@cyberg8t.com**.

Texas QSO Party, sponsored by the Texas DX Society. 1400Z May 23 to 0500Z May 24 and 1400Z to 2000Z May 24. Categories: single op, multi-single and multi-multi; Texas mobile single op and multiop; QRP single and multi xmtr; and a Club Aggregate category. Exchange RST and State, province, country, or maritime region. Texas stations send RST and county. Suggested frequencies: CW - 30 kHz up. Phone - 25 kHz up in General class segments. VHF - 50.200 144.200. Work stations once per band and mode. Texas mobiles may be worked once per band/mode from each county. Score 2 pts/phone QSO and 3 pts/CW and other digital mode QSO. Multipliers: non-Texas stations use number of Texas counties worked (254 max plus Armadillo County mystery station). Texas stations use number of Texas counties, states, Canadian Provinces, and DX countries (less USA, Canada, Hawaii and Alaska). Add bonus points to your final score: Non-Texas stations add 100 points for every 10 Texas mobiles worked per band/mode. Texas stations add 100 points for every 10 Texas mobiles worked per band/mode. Texas mobiles add 5000 points per every 5 counties covered with at least 5 contacts per county and add 100 points for every 10 Texas mobiles worked per band/mode. Send logs (and dupe sheets if over 200 QSOs) by June 5, 1997 to TDXS, POB 540291, Houston, TX 77254; **W5HNS@aol.com; http://n5uh.tech.uh.edu/~tdxs/**.

25-26

Memorial Day CW Sprint, sponsored by the Michigan QRP Club, 2300Z May 25 until 0300Z May 26. CW only, 160-6 meters (except 30, 17 and 12 meters). Classes: <250 mW; 250 mW to 1 W; 1 W to 5 W; and over 5 W. Exchange RST, state/province/DXCC entity and power output (MI-QRP members send membership no.). Work stations once per band. Score 5 pts/QSO w/MI-QRP members, 4 pts/QSO w/non-members outside W/VE and 2 pts/QSO with W/VE nonmembers. Multiply QSO points by states/provinces/DXCC entities worked per band × 1.25 if you are using a homebrew receiver or transmitter. Awards. Send logs to L. T. Switzer, N8CQA, 654 Georgia Ave, Marysville, MI 48040-1243; **n8cqa@tir.com.**

30-31

CQ WW WPX Contest, CW, see Mar *QST*, p 101.

June Events

6	QRP Tactical Contest
13-15	**ARRL June VHF QSO Party**
20-21	All-Asian DX Contest, CW
27-28	**Field Day**

Special Events

*Edited by **Bev Fernandez, N1NAV** • Assistant Contest Manager*

Louisville, KY: Amateur Radio Transmitting Society, Inc, W4CN, 0001Z **May 1** to 2359Z **May 3,** 124th Kentucky Derby, 3.850 7.250 14.250 28.400. Certificate. Shelby Summerville, K4WW, 6505 Lantana Ct, Louisville, KY 40229-1544.

Marion, AR: Driven Elements ARG, K5M, 2200Z, **May 1** to 0200Z **May 2**, and 6th annual Esparanza Bonanza Festival, 7.285 21.375 28.410. Certificate. R Brockwell, 118 Brougham, Marion, AR 72364.

Beavercreek, OH: Upper Valley ARC, KI8CJ, 2000Z **May 1** to 2000Z **May 2** Fourth Anniversary of Parkwood Elementary School's fourth grade class Adopt-A-Ham Program, 145.41 146.94 146.64 145.19. QSL. Mike Fisher, KI8CJ, 1791 Wilene Dr, Dayton, OH 45432.

Eldon, MO: Northside ARC, AAØVM, 1500Z **May 1** to 2300Z **May 3**, Opening of the Lake of the Ozarks Community Bridge, 7.250 14.250 21.350 28.350. Certificate. Northside ARC, Box 954, Rocky Mount, MO 65072.

Aquinnah, MA: Fall River ARC, W1ACT/P, 1800Z **May 1** to 1500Z **May 3**, Iota NA046 from Gay Head Lighthouse Marthas Vineyard Island, 14.260 all HF bands. QSL. Roland Daignault, N1JOY, 19 Davis Rd, Westport, MA 02790.

Freedom Township, OH: Portage ARC, KB8UUZ, 1700Z **May 1** to 2300Z **May 3**, 40th Annual Loyalty Day, 40 20 15 10. Certificate. Tom Parkinson, KB8UUZ, 9992 State Rte 700, Mantua, OH 44225.

Brownsville, TX: CHARRO ARC, KC5PCN, 1300-2000Z **May 2**, operating from the last battle of the Civil War fought near Brownsville, General portion of 20 15 and Phone portion of the Novice 10 meter. Certificate. CHARRO ARC, 3554 Boca Chica Blvd, Brownsville, TX 78521.

Salt Lake City, UT: Utah ARC, N7T, 1600-2300Z **May 2**, Scout-O-Rama Communications Exercise, 7.235 14.265 21.350 28.400. QSL. Eugene Christensen, KC7CSE, 1193 Serpentine Way, Sandy, UT 84094-4633.

Farmville, VA: Southside ARA, KE4ZBH, 1400-2000Z **May 2**, Heart of Virginia Festival, 7.225 14.225 50.200 28.385. QSL. John Austin, N4CFA, 1001 7th Ave, Farmville, VA 23901-2317.

Novi, MI: Novi ARC, KC8FSW, 1400-2100Z **May 2**, 2nd Annual Indy 500 Celebration, 7.244 7.246 7.125 21.325. QSL. NARC, Box 268, Novi, MI 48376-0268.

Chancellorsville, VA: Rappahannock Valley ARC, NJ4F, 1500-2100Z **May 2**, General portion of 20 40. Certificate. RVARC, Box 1496, Fredericksburg, VA 22402

Annondale, MN: Explorer post 676. KØBSA, 2300-0300Z **May 2**, **and 1500-0200 May 3**, Sterns Boy Scout Camper-All, 7.290 14.290 18.140. Certificate. Gordy Hanson, NØZRD, 2317 Byrd Ave N., Golden Valley, MN 55422.

Sunflower, KS: Sandhills and Trojan ARC, KØS & WØMI, 0000Z **May 2** 2400Z **May 3**, Operating from the highest point in Kansas, 3.920 14.285 .040 CW. Certificate. Mt Sunflower Expedition, Box DX, Colby, KS 67701.

Philadelphia, PA: The Olympia ARC, WA3BAT, 1300Z **May 2** 2200Z **May 3**, 100th Anniversary of Admiral Dewey's triumph over the Spanish Fleet. 3.898 7.248 14.030 21.040. Certificate. Olympia ARC, 211 South Columbus Blvd, Philadelphia, PA 19106.

Madison, WI: Four Lakes ARC, W9S/W9IXG, 1400Z **May 2** 0200Z **May 10**, 150th Anniversary of Wisconsin Statehood, 28.325 50.175 144.225 144.55. Certificate. UW Space Place, 1605 S Park St, Madison, WI 53715.

Canon City, CO: Royal Gorge ARC, KBØTUC, 1400-2100Z **May 3**, Annual Music and Blossom Festival, Lower portions of General bands 40-15. Certificate. Chuck Ward, NCØA, 1101 Harrison St, Canon City, Co 81212.

Wausau, WI: Wisconsin Valley RA, W9SM, 1500Z **May 5** to 2000Z **May 8**, Dream Flight Wausau, 14.250 21.325 28.325 146.640. Certificate. Wisconsin Valley RA, Box 363, Wausau, WI 54402-0363.

West Mifflin, PA: Belle Vernon High School ARC, KB3BKW, 1400-2000Z **May 7**, Amusement Park Physics and Communications Day, 3.850 7.225 14.225 21.300. Certificate. Belle Vernon HS Arc, 425 Crest Ave, Belle Vernon, PA 15012.

Middlebourne, WV: Tyler County ARO, KC8GXI, 1400Z **May 8** to 2200Z **May 9**, Commemorating the Tyler Co Historic Museum, 3.860 7.230 14.270 28.320. Certificate. TCARO, Box 287, Middlebourne, WV 26149.

Fairfield, CT: Fairfield ARA, WB1CQO, 1400-2000Z **May 9**, 63rd Annual Dogwood Festival, General portion of 40 20 15 10. Certificate/QSL. FARA, WB1CQO, Box 486, Southport, CT 06490-0486.

Luther, OK: Luther Historical Society/Luther Youth ARC, KB2AW, 1500-2300Z **May 9**, 100th Anniversary of Luther, 14.250 21.350 28.400. Certificate, Luther Historical Society, Box 601, Luther, OK 73054-0601.

Broken Arrow, OK: Broken Arrow ARC, W5BBS, 1400-2200Z **May 9**, Annual Roster Day, 3.900 7.200 14.300 21.400. Certificate. BAARC, Box 552, Broken Arrow, OK 74013-0552.

New Bern, NC: New Bern ARC, N4B, 1200-2000Z **May 9**, 100th Birthday of Pepsi, invented in New Bern, 7.113 7.248 14.248 146.610. Certificate. New Bern ARC, Box 12483, New Bern, NC 28561-2483.

Washington, DC: Boy Scout Troop 170, K2BSA/3, 1400-1900Z **May 9**, National Capitol Area Council Scout Show on the Mall, 7.230. Certificate. Jay Chamberlain, AE4MK, 27 Fox Run Ln, Fredericksburg, VA 22405.

Logansport, IN: CCARC, W9V, 1400-0200 UTC, **May 9**, 45th Anniversary of CCARC, 7.255 14.282 28.330 146.520. QSL. The Cass Co ARC, Box 1092, Logansport, IN 46947.

Leesville, SC: Ridge ARC, W4RRC, 1600-2000Z **May 9**, South Carolina Poultry Festival, 14.260 21.360 28.360 147.255. Certificate. RARC, Box 1046, Leesville, SC 29070.

Blackfoot, ID: Pocatello ARC, N7PI, 0000Z **May 9** to 0000Z **May 10**, Tendoy District Boy Scout Jamboree, 7.250 14.250 21.350 28.350. QSL. Pocatello ARC, Box 2722, Pocatello, ID 83206-2722.

Fairmont, WV: Mountaineer ARC, W8SP, 0000Z **May 9** to 2400Z **May 10**, First Mothers Day observance at the International Mothers Day Shrine, General portion of 80 40 20 15. Certificate. Chuck McClain, K8UQY, RR4 Box 161, Grafton, WV 26354.

Selinsgrove, PA: Susquehanna Valley ARC, W3VPJ, 1300Z **May 9** 0200Z **May 10**, 10th Anniversary of SVARC affiliation with the ARRL, 10-80 in the general portion of each band. Certificate. SVARC Special Event Station, Box 73, Hummels Wharf, PA 17831.

Ono, CA: Cops Contest Club, W6P, 0000Z **May 10** to 2400Z **May 17**, Commemorate National Police Officers Week, 7.290 28.490 21.390 14.290. Certificate. Jerry Boyd, Box 252, Igo-Ono, CA 96047.

Dayton, OH: Dayton Amateur Radio Association, W8BI/8, 1200 to 2201Z, **May 15**, 1200 to 2100Z **May 16** and 1200 to 1600Z **May 17**. Dayton Hamvention. 25kHz from bottom of 20 and 40 meter General phone and CW subbands; 25 kHz from bottom of 40-meter Novice/Technician Plus CW subband. QSL. W8BI/8, PO Box 44, Dayton, OH 45401-0044.

Gadsden, AL: Gadsden RC, K4JMC, 1700Z **May 15** to 0500Z **May 17**, Riverfest 98, 3.965 7.230 14.260 147.16. Certificate. GARC, K4JMC, Box 392, Gadsden, AL 35902.

Wheaton, IL: Dupage ARC, W9DUP, 1500-2100Z **May 16**, Armed Forces Day, 7.250 14.290 28.400 145.25. Certificate. John McCarty, Box 71, Clarendon Hills, IL 60514.

Baltimore, MD: Maryland Mobileers ARC, W3N, 1400-2000Z **May 16**, Honoring the Submarine Service, 7.240 14.240 21.340 28.340. Certificate. MMARC, Box 935, Severn, MD, 21144.

Hayesville, NC: Triode ARC, AD4FJ, 1400-1800Z **May 16**, Smokey Mountain Ham Radio Picnic, 7.275

10.110 50.125 146.550. Certificate. Triode ARC, Box 1721, Andrews, NC 28901.

Intake, MT: Lower Yellowstone ARC, W7DXQ, 1500Z **May 16** to 1700Z **May 17**, Annual Paddlefish run up theYellowstone river, 3.860 7.240 21.375 28.450. QSL. LYARC c/o K Braun, Box 101, Savage, MT 59262.

Wall, NJ: Ocean Monmouth ARC, N2MO, 1400Z **May 16** to 1400Z **May 17**, Marconi Special Event at the original site of one of Marconi's towers, 7.265 14.265 21.265 28.380. Certificate. OMARC, Box 267, Oakhurst, NJ 07755.

Springfield, IL: Sangamon Valley RC, W9DUA, 1500Z **May 16** to 2300Z **May 17**, 10th Anniversary of IL Vietnam Vets Memorial, 7.240 14.250 21.350 28.400. QSL. SVRC/Red Cross Bldg, 1025 S 6th, Springfield, IL 62703-2403.

Angels Camp, CA: Calaveras ARS, WA6YGA, 1400Z **May 16** to 0300Z **May 17**, Calaveras County Fair and Frog Jumping Jubilee, 7.240 14.240 21.320 28.385. Certificate. CARS, Box 391, Angels Camp, CA 95222.

Poughkeepsie, NY: Poughkeepsie ARC, W2CVT, 1300-2100Z **May 16-17**, Operating from the Samuel F. B. Morse Home, 3.680 7.105 10.105 14.050. QSL/Certificate. Don Stein, 3 Little Rd, Wappingers Falls, NY 12590.

Miles City, MT: South Eastern Montana ARC, KC7KHS, 1500Z **May 16** to 0100Z **May 17**, Miles Creek Bucking Horse Sale, 14.265 28.400. Certificate. Randy Schock, K7RNS, 611 N Cottage Grove, Miles City, MT 59301.

Houston, TX: Clear Lake ARC, W5H, 0000Z **May 17** to 2400Z **May 31**, Hurricane Party, 14.240 28.350 146.64 442.75. Certificate. CLARC, W5H, Box 57714, Webster, TX 77598.

Womelsdorf, PA: Strangers & Pilgrams AR Kindred, N3SWH, 1700-2200Z **May 21**, Ascension of Jesus Christ into Heaven. General 40 and 20 147.285. Certificate. SPARK, Box 57, Mt Aetna, PA 19544.

Nutley, NJ: Robert D Grant Labor ARA, KB2YCT, 2200Z **May 22** to 2200Z **May 25**, CQ Memorial Day, dedicated to all who made the supreme sacrifice in service to our country, 28.420 52.525 146.550. Certificate. RDGULARA, Box 716, Nutley, NJ 07110-0716.

Green Bay, WI: GreenBay Mike & Key Club, W9I, **May 22** to 2300Z **May 30**, Wisconsin Sesquicentennial, Lower 25 kHz of General bands 28.390. Certificate. Keith Summers, KS9WL, 918 Bluebird St, DePere, WI 54115.

South Sioux City, NE: 3900 Club & Sooland ARA, W2O, 0000Z **May 22** to 2400Z **May 31**, To celebrate the 20th Hamboree, 3.900 7.040 14.040 21.325. QSL/Certificate. Tim Jarman, KØUX, 3159 Dearborn Blvd, Sioux City, IA 51104.

Chestertown, MD: Kent ARS, K3ARS, 1400-2100Z **May 23**, Reenactment of the 1774 Chestertown Tea Party, 7.040 7.240 14.240 28.340. Certificate. William Rogers, N2UYW, Box 427, Chestertown, MD 21620.

Ashtabula, OH: United States Power Squadrons, N3HOW/8, 1400-2200Z **May 23**, National Safe Boating Week, 7.267 14.267 21.367 28.367. Certificate. Donald Stark, N3HOW, 65 Stark Spur, Eighty Four, PA 15330.

Huntsville, TX: Sam Houston RS, W5SAM, 1300-2200Z **May 23**, Operation at the site of the world's tallest statue of an American hero, 14.240 21.300 28.495. QSL. Sam Houston RS, 407 Elkins Lake, Huntsville, TX 77340.

Sumter, SC: Sumter ARA, W4GL, 0400Z **May 23** to 1700Z **May 24**, 58th Irish Festival, 3.900 7.260 14.290 21.370. Certificate. Sumter ARA, Box 193, Sumter, SC 29151-0193.

Killeen, TX: KA5ACT, 1600Z **May 23** to 2400Z **May 25**, Commemorate Memorial Day, 21.375 14.330 28.375. Certificate. Theron Johnson, 1212 Bonnie Dr, Killeen, TX 76542-1226.

Canfield, OH: 20/9 ARC, K8TKA, 1300-2200Z **May 25**, Memorial Day, 7.260 14.275. QSL/Certificate. 20/9 ARC, 2895 Penny Ln, Youngstown, OH 44515.

Elgin, IL: Elgin ARS, W9IKN, 1300-1800Z **May 25**, 11th Annual Valley Fox Trot 10 Mile Race, 7.235 14.240 50.135 147.525. Certificate. Elgin ARS, Box 1351, Elgin, IL 60121.

Belleville, MI: Yankee Air Force/Museum, W8YAF, 1200-2000Z **May 25**, Celebrating Memorial Day, 7.270. Certificate. Frank Niagy, N8BIB, 24315 Waltz Rd, New Boston, MI 48161-9380.

Milwaukee, WI: Miller Valley ARC, W9CUS, 0000Z **May 28** to 2400Z **May 31**, Commemorating Wisconsin's 150th Anniversary, 3.700 7.250 14.180 28.350. Certificate. Ronald Terry, N9VGI, 1512 W Mitchell St, Milwaukee, WI 53204-3242.

Belmont, WI: Hidden Valleys ARC, W9B/K9OT, 1500Z **May 29** to 2100Z **April 10**, 150th Anniversary of Wisconsin's Statehood, 80 40 20 15. Certificate. HVARC, Box 112, Platteville, WI, 53818-0112.

Glasgow, KY: Mammoth Cave ARC, KY4X, 1400-2200Z **May 30**, Annual Glasgow Highland Games, 7.250 14.250 21.300 28.300. Certificate. Wendell Kennison, AD4EI, Box 23, Summer Shade, KY, 42166.

Wausau, WI: Wisconsin Valley RA, W9W, 0000-2400Z **May 30**, Wisconsin's 150th year of statehood, 28.475 21.325 14.275 144.200. Certificate. W9SM, Box 363, Wausau, WI 54402-363.

Pasco County, FL: Pasco County RACES, KA1WOR, 1400-1800Z **May 30**, 4th Annual Hurricane Expo/Hurricane Awareness Education, 14.250 28.325. Certificate. Michele Baker, Office of Disaster Preparedness, 8744 Government Dr, New Port Richey, FL 34654.

Le Mans Cedes, France: Radio Club TM6ACO, **May 30** to **June 7**, Les 24 Heures Du Mans auto race, Phone and CW, A special QSL will be sent. Assoc. Des Radioamateurs De La Sarthe, Reseau De Emetteurs Francais, BP 88 72002 Le Mans Cedes, France.

Certificates and QSL cards: To obtain a certificate from any of the special-event stations offering them, send your QSO information along with a 9×12 inch self-addressed, stamped envelope to address listed in the announcement. To receive a special event QSL card (when offered), be sure to include a self-addressed, stamped business envelope along with your QSL card and QSO information.

Special Events Announcements: For items to be listed in this column, you must be an Amateur Radio club, and use the ARRL Special Events Listing Form. Copies of this form are available via Internet (**info@arrl.org**), the ARRL BBS (860-594-0306), or for a SASE (send to Special Requests, ARRL, 225 Main St, Newington, CT 06111, and write "Special Requests Form" in the lower left-hand corner. Submissions must be received by ARRL HQ no later than the 1st of the second month preceding the publication date; ie, a special-event listing for **Nov** *QST* would have to be received by **Sep 1**. Submissions may be sent on an MS-DOS floppy disk in ASCII format, via fax at 860-594-0259, via modem (860-594-0306), via the Internet (to **contest@arrl.org**), or in letter form. QST

New Products

A POCKET-SIZE GUIDE TO YAESU'S VX-1R HAND-HELD

◊ Carrying a hand-held rig that's as small as Yaesu's VX-1R is a breeze—as long as you don't have to lug around a full-size user's manual, that is! To the rescue comes Hugh McCully, VE3AYR's, *VX-1R Pocket Reference*, a small book that's "big" on usefulness. Measuring about the same size as the radio it covers, the *Pocket Reference* is a handy, simple, and well-done guide to a sometimes complex radio.

Price: $4.95. For information on Hugh's complete line of mini manuals, contact VE3AYR, Janus Computer Services, 610 Barons Ct, Burlington, ON L7R 4E4 Canada; tel 905-333-0826, **http://www.bigwave.ca/~janus/hrm/**, e-mail **janus@ bigwave.ca**.

1998 POLICE CALL EDITIONS NOW AVAILABLE

◊ Updated editions of the country's best-selling frequency guides for scanner enthusiasts now are available. *Police Call*'s nine 1998 regional editions total 350,000 listings, including two-way radio frequencies in 18 additional categories. Also covered are radio codes, FCC frequency allocation tables, maps and more.

Price: $12.99. For more information, see your local Amateur Radio dealer or contact Hollins Radio Data, PO Box 35002, Los Angeles, CA 90035; tel 310-202-1418.

KLINGENFUSS FREQUENCY GUIDES FOR 1998

◊ Veteran shortwave frequency sleuth Joerg Klingenfuss has released 1998 versions of his venerable broadcast and utility station frequency guides—in book form and on CD-ROM. The trio of 1998 volumes includes *The 1998 Shortwave Frequency Guide*, *The 1998 Guide to Utility Radio Stations*, and *The 1998 Super Frequency List* on CD-ROM (the *Windows 3.x* and *Windows 95* CD now includes receiver control software for computerized convenience).

Used by professional and hobbyist listeners for years, Klingenfuss publications are known for their thoroughness and accuracy. For detailed content descriptions and color screen shots, point your Web browser to **http://ourworld.compuserve.com/homepages/Klingenfuss/**, or request a catalog from Klingenfuss Publications, Hagenloher Str 14, D-72070 Tuebingen, Germany; tel 49-7071-62830, fax 49-7071-600849, e-mail **klingenfuss@compuserve.com**.

COAXIAL CABLE ASSEMBLIES FROM CABLE X-PERTS

◊ Cable X-PERTS has added three coaxial cable assemblies to its comprehensive line of transmission lines and related RF products. The first, priced at $14.95, is a 3-foot length of RG58/U with a right-angle male BNC connector on one end and an SO239 UHF socket on the other. The second, also priced at $14.95, almost identical to the first assembly, replaces the SO239 with a male PL259 UHF plug. The third assembly, priced at $9.95, is a three-foot length of RG174/U miniature 50-Ω coax with male BNC connectors on each end.

All cables and components are of the highest quality and are individually tested for electrical and mechanical integrity. Prices do not include shipping; minimum order is $20. For more information, contact Cable X-PERTS, 416 Diens Dr, Wheeling, IL 60090; tel 800-828-3340; fax 847-520-3444; **http://www.cablexperts.com**. QST

The 1997 ARRL November Sweepstakes CW Results

By **Randall A. Thompson, K5ZD**
11 Hollis St, Uxbridge, MA 01569
e-mail **k5zd@contesting.com**
and
Billy Lunt, KR1R
Contest Manager

It was three days after the 1997 ARRL November Sweepstakes CW contest and Alan was comparing experiences with Alex, a new member of the local radio club. Alex was recently licensed and Sweepstakes had been his first attempt at CW contesting.

"I couldn't believe how crowded the bands were!" Alex exclaimed. "Every band seemed to be filled with stations calling CQ SS."

Alan nodded, recalling the contest and how much more enjoyable it had become since installing 250-Hz CW filters.

Alex continued, "Some guys were sending so fast that I really had to concentrate to catch their calls. When I called them, I would send QRS after my call—just like you suggested. And it worked! They slowed down to match my speed."

"Of course," replied Alan. "They want to work you as badly as you want to work them. The good operators will always slow down and repeat things as many times as you need."

"There is one thing I don't really understand," said Alex.

Alan leaned forward expecting some deep philosophical question penetrating to the core of his contesting soul.

"What is a precedent?" asked Alex.

Alan blinked and thought for a moment as he tried to understand the question. As one who had come up through the CW traffic handling ranks, it was a question he had never really considered.

He tried to explain. "The correct term is 'precedence.' It is part of the official ARRL message preamble. In traffic handling, it indicates the order in which messages are to be handled: Emergency first, Priority next, then finally Routine.

"The Sweepstakes exchange is derived from the official message format used in traffic handling. That's why there are so many elements in the exchange.

"Precedence became part of the SS exchange in 1966, when it was added after the message number. All exchanges carried the R precedence, for Routine. In 1968, it was changed to indicate power levels—A for 150 W and less, or B for over 150 W. Q for QRP was added in 1987."

"Is that also why they call the year licensed the 'check'." asked Alex?

"Yes," replied Alan. "In a message, the check represents the number of words that are in the message. For the Sweepstakes, since there is no message, it is the year the operator was first licensed."

"I worked one station that sent a check of 17. That guy must be old!" exclaimed Alex.

"Well, some club stations like to use the year they were first licensed just for the novelty. But there are some regular SS participants, like W6BIP in San Francisco, who have been around for a long time and enjoy giving out a low number."

"The hard part for me," said Alex, "was knowing how to ask for repeats on the precedence and check. I didn't know what to send."

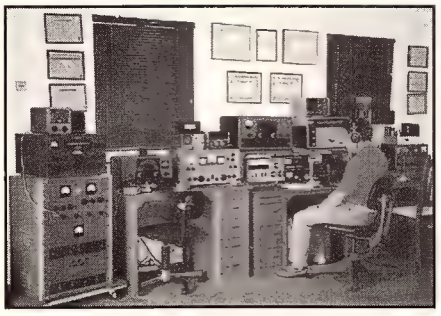
Enjoying the role of teacher, Alan explained. "For the precedence, most people send PR? or PREC? to request a fill. If that fails, I sometimes try POWER?"

"Oh," said Alex. "I had several people send PR and I thought they were asking for the number again!"

"Yes, that is a common difficulty. As for the check, usually CK? gets the job done. But YR? or YEAR? are also effective."

"That makes sense now that you explain it," said Alex. "This contesting stuff is a lot of fun. What can you tell me about the Phone Sweepstakes coming up?" asked Alex.

Alan smiled with the realization that the contest flame was beginning to flicker in this one. "Well, it's a completely different contest..."



Rob, K6RB, operating high power from SCV tried for a clean sweep but missed it by only two—YT and MAR.

Top Ten

CW

Single Operator, QRP

N5TJ	166,058
WØUN (K9AN,op)	137,214
K1TR	125,096
NØAX	114,660
KG5U	110,048
K7MM	106,650
AA7KF	105,490
W7YAQ	97,736
K9OM	95,000
K3CR (KB3AFT,op)	94,572

Single Operator, Low Power

KØEU	190,008
K7BG	184,860
WP2Z (AG8L,op)	183,300
VE7CC	179,172
AD6DO	179,172
N4ZZ	177,276
KN4T	176,170
K7FR	173,404
K5RT	173,168
K6LA	168,744

Single Operator, High Power

WØSD (WDØT,op)	234,788
N2IC	229,416
W5WMU (N6TR,op)	229,100
K1TO	227,362
WBØO	226,572
K7UP (KN5H,op)	217,882
W6GO (N6IG,op)	217,724
K6LL	217,566
K5GN	216,934
K5BN (K5GA,op)	216,618

Multioperator

K4OJ	217,408
KO7X	203,346
K8LX	197,974
W9JA	195,920
K5MDX	192,760
W3GH	189,916
ABØS	188,136
KØRWL	182,806
K6RC	175,696
AA2FB	172,694

High Power Category

Heading into the contest, N6TR had made it clear that he planned to drive W5WMU to his third high power title in a row. The rest of the high power entrants were equally determined to stop him. Who could do it?

The answer came from a somewhat unlikely place—South Dakota! Todd, WDØT, operated WØSD to his first Sweepstakes victory and the first ever from that area of the country. Todd is no stranger to the top ten, having finished in third last year, and was considered a true contender. But the fifth call area seemed to have a lock on the top spot with wins in seven of the last eight years. Short of W5WMU's 1995 all time record score, Todd gets a new division record to go with his win. Could this be a precedent setting effort for next year?

In a tight battle for second place, Steve, N2IC, in Colorado just squeaked by Tree, N6TR, (operating at W5WMU) by a mere two contacts. Tree got the contest off to a fast start by making 580 QSOs in the first 6 hours! With 12 hours left to go in the contest Steve knew Tree was more than 100 contacts ahead of him. Undaunted, Steve racked up some big hours on 20 meters during the Sunday afternoon doldrums while Tree struggled! Steve caught him in the final hour to take second overall and a new Rocky Mountain Division record.

Claiming that he only has his 20 meter antennas working, Dan, K1TO, took advantage of his new South Florida QTH to take the fourth spot. Dan made over 600 of his contacts on 40 meters using a ground mounted HF2V vertical! What's he going to do when he gets his real antennas up?

Just five QSOs back is another repeat

CW Top Five

Boxes list call sign, score and class (Q = QRP, A = Low Power, B = High Power, M = Multioperator)

Northeast Region (New England, Hudson and Atlantic Divisions; Maritime and Quebec Sections)			Southeast Region (Delta, Roanoke and Southeastern Divisions)			Central Region (Central and Great Lakes Divisions; Ontario Section)			Midwest Region (Dakota, Midwest, Rocky Mountain and West Gulf Divisions; Manitoba and Saskatchewan Sections)			West Coast Region (Pacific, Northwestern and Southwestern Divisions; Alberta, British Columbia and NWT/Yukon Sections)		
K1TR	125,096	Q	N4UW	90,324	Q	K9OM	95,000	Q	N5TJ	166,058	Q	NØAX	114,660	Q
K3CR (KB3AFT,op)	94,572	Q	K5SL	89,076	Q	W8RU	88,160	Q	WØUN (K9AN,op)	137,214	Q	K7MM	106,650	Q
			W2CS	80,106	Q	WA8RJF	79,952	Q				AA7KF	105,490	Q
AD8J	87,780	Q	N4ROA	77,964	Q	K8XXX (K8AQM,op)	79,560	Q	KG5U	110,048	Q	W7YAQ	97,736	Q
W1AW (W1VT,op)	78,736	Q	W8DL	59,280	Q				NØUR	92,554	Q	N7IR	93,300	Q
						K8DD	60,198	Q	W5TFB	88,950	Q			
KA1O	77,184	Q												
W2TZ	159,432	A	WP2Z (AG8L,op)	183,300	A	K8BL	162,740	A	KØEU	190,008	A	K7BG	184,860	A
WA1S	149,468	A				K9IG	160,054	A	K5RT	173,168	A	VE7CC	179,172	A
K1VUT	146,016	A	N4ZZ	177,276	A	W8MJ	159,738	A	NØNR	166,296	A	AD6DO	179,172	A
WT1O	144,456	A	KN4T	176,170	A	K9TR	156,262	A	K7CF	159,896	A	K7FR	173,404	A
KM1X	143,780	A	NA4K	158,312	A	KU8E	148,824	A	NØAT (NØKK, op)	159,744	A	K6LA	168,744	A
			WJ9B	144,570	A									
									WØSD (WDØT,op)	234,788	B			
K5ZD	204,136	B	W5WMU (N6TR,op)	229,100	B	K9DX	189,916	B				W6GO (N6IG,op)	217,724	B
N2NT (N2NC,op)	202,488	B	K1TO	227,362	B	WI9WI	163,086	B	N2IC	229,416	B	K6LL	217,566	B
K1AM	194,498	B	WC4E	201,134	B	WT9Q	159,120	B	WBØO	226,572	B	N7TR	215,828	B
K3MM	194,024	B	N4BP	200,148	B	W8RC	147,896	B	K7UP (KN5H,op)	217,882	B	W7RM	203,424	B
W1WEF	193,708	B	W4AN (K7GM,op)	195,130	B	KE9I	146,308	B				W6NL	202,714	B
									K5GN	216,934	B			
									KO7X	203,346	M			
W3GH	189,916	M	K4OJ	217,408	M	K8LX	197,974	M	ABØS	188,136	M	K6RC	175,696	M
AA2FB	172,694	M	K5MDX	192,760	M	W9JA	195,920	M	KØRWL	182,806	M	N6VR	171,272	M
K2TW	170,640	M	W4RM	164,794	M	K4LT	163,688	M	KTØR	172,536	M	N6KI	170,008	M
NA2N	166,374	M	NT4D	130,900	M	K8JM	150,732	M	KJØG	142,896	M	N6ZS	166,532	M
K2DS	148,520	M	K5MC	123,900	M	K9MMS	132,088	M				K6RCC	162,266	M

member of the top ten club, WBØO. Bill makes sure everyone has rare North Dakota for the sweep. He made over 800 contacts on 20 meters using a TH7DXX at 50 feet. You get the feeling that the Dakotas were the place to be for the first weekend of November 1997.

An old Op Aid 6 dupe sheet could cover the rest of the top ten. Just eight QSOs were the difference between K7UP (KN5H, opr) at number 6 and K5BN (K5GA, opr) at number 10. W6GO, with N6IG at the key, just got by perennial top ten visitor K6LL for the high West Coast score. In ninth, K5GN got back into the top ten after missing last year.

Top score back east was Randy, K5ZD in WMA, who finished 15th overall. John, N2NC, operating from N2NT had six more QSOs, but missed VE1 for the sweep and the honorary title of eastern champion.

Low Power Category

In the contest's most popular entry category, Randy, KØEU, demolished the competition for his first national SS victory. Despite missing a section, Randy's 48 QSO lead put him firmly in front.

The battle for second place was much closer and missing a section made all the difference. Matt, K7BG, in Montana just got by Dave, AG8L, operating from the rental station of WP2Z. Dave finished with five more QSOs than Matt but missed Yukon to finish in third. Matt commented that he never worked leader KØEU and wonders if this is the first time the top two in a category didn't work each other?

Fourth place is as close as it gets! When the log checkers were through, Dan, AD6DO, and Lee, VE7CC, finished in a perfect tie. It was a battle of youth versus experience. Dan is a 16-year-old up-and-comer while VE7CC packs years of SS top ten experience. They'll have to come back next year for a rematch.

Next up is Don, N4ZZ, for his third consecutive year in the top ten, followed by Walt, KN4T. Gary, K7FR, had enough QSOs to beat Don, but missed Maritime *and* Yukon to land in the eighth position. After 8 years of making sweeps, Gary summed it all up by saying, "I think the sweep is more important to me than 1000 QSOs." K5RT, a newcomer to the SS top ten, finished ninth.

Ken, K6LA, got the last spot in the list, but not without some competition. NØNR was just two contacts back but missed a section. N6NF had enough QSOs to finish number 10 but he missed two sections. Kind of makes the decision to run rate or chase the last section a little more interesting, doesn't it?

QRP Category

Name this contester! With his victory in the QRP category he becomes the first person ever to achieve Sweepstakes category victories five years in a row. Interestingly, he won high power twice, then low power twice, and now QRP—the last three from his home station. His score breaks the QRP category record by over 37K (that's 181 QSOs!). He made nearly 500 band changes in amassing his 1051 contacts.

If you said Jeff, N5TJ, you have probably been beaten by him before. Jeff simply destroyed a very competitive QRP category and set a standard that will be hard to beat. Steve, K9AN, visited the perpetually under construction super station of WØUN in Colorado to break the existing QRP record and win the 'mere mortal' category. Steve missed Maritime and Yukon for his sweep.

Last year's champion Ed, K1TR, again visited neighbor N6BV's station, this time to finish in third. After losing power in a storm at 0550Z, Ed went to bed only to wake at 12Z and find the power still off. He ran home, picked up a generator, and operated on emergency power until 18Z when the power returned. He does earn a new division record for his extra effort! Ed reported that he never heard Yukon or the new NL section for his sweep.

In fourth, with a personal best score, is Ward, NØAX, operating from Western Washington. A regular QRP entrant, Ward was thrilled to have the category taken seriously by former high power ops. Despite missing NNY for the sweep, he was optimistic for next year now that 10 and 15 meters are showing promising signs of life.

QRP activity was definitely up in part due to new interest from the growing QRP community. The QRP Internet mailing list was buzzing with excitement over new states and QSO totals following the contest. With top scores from all areas of the country, the QRP category is free from the geographic bias found in the other categories. You really can win from anywhere — and have a lot of fun doing it.

Multioperator Category

The multiop category saw a repeat victory by Jim, K4OJ (who was K1ZX last year). Jim started the contest as a single op. On Sunday afternoon, afraid of missing the Sweep, Jim enlisted his parents (W1CW and W1YL) to join in the search for Yukon. The result was an easy victory for this family affair. Yes, they got the sweep!

KO7X from Utah finished second with one of the most accurate logs received. The battle for third was a Midwestern show down between K8LX in Michigan and W9JA in Wisconsin. K5MDX in Mississippi took fifth.

ARRL November Sweepstakes Plaque Winners

Listed below are all of the plaque category winners. Only plaques with sponsors will be awarded. If you have won a plaque category without a sponsor, you may purchase your own plaque. The cost is $50 per plaque. If you, your club, or business is interested in sponsoring any of the unsponsored plaques call Billy Lunt, KR1R, 860-594-0252.

Category	*Winner*	*Donor*
Overall		
QRP CW	N5TJ	MI QRP Club
Low Power CW	KØEU	In Memory of Charles Oakes, W6UQF
High Power CW	WØSD (WDØT,op)	N5KO and WØUA
Multioperator CW	K4OJ	
Atlantic Division		
QRP CW	K3CR (KB3AFT,op)	
Low Power CW	W2TZ	Potomac Valley Radio Club
High Power CW	K3MM	North Coast Contesters
Multioperator CW	W3GH	North Coast Contesters
Central Division		
QRP CW	K9OM	Charlie Kuhn, N9NVV
Low Power CW	K9IG	In Memory of Mike Corke, N9AEJ
High Power CW	K9DX	In Memory of Richard Harper, W9RW
Multioperator CW	W9JA	
Dakota Division		
QRP CW	NØUR	Tod Olson, KØTO
Low Power CW	NØAT (NØKK, op)	
High Power CW	WBØO	Minnesota Wireless Assn, WØAA
Multioperator CW	KTØR	Minnesota Wireless Assn, WØAA
Delta Division		
QRP CW	N4UW	Pat Sonnier, W5WMU
Low Power CW	N4ZZ	
High Power CW	W5WMU (N6TR,op)	
Multioperator CW	K5MDX	Twin City Ham Club
Great Lakes Division		
QRP CW	W8RU	Bill Maxson, N4AR
Low Power CW	K8BL	Mad River Radio Club
High Power CW	W8RC	North Coast Contesters
Multioperator CW	K8LX	David Smith, ND4Y
Hudson Division		
QRP CW	KF2HC	NJ-QRP Club
Low Power CW	W2LK	John Golomb, N2NC
High Power CW	N2NT (N2NC,op)	Edgar Gilbert, K2SQ
Multioperator CW	AA2FB	Stuart Silverstein, K3UEI, Memorial
Midwest Division		
QRP CW	NØEID	
Low Power CW	NØAV	Johnson County Contest Club, NØJX
High Power CW	KØWA	
Multioperator CW	ABØS	
New England Division		
QRP CW	K1TR	Maryland Milliwatt Club
Low Power CW	WA1S	Brian Szewczyk, NJ1F
High Power CW	K5ZD	
Multioperator CW	W1SA	

Category	*Winner*	*Donor*
Northwestern Division		
QRP CW	NØAX	Paladin Contest Club
Low Power CW	K7BG	
High Power CW	W7RM	
Multioperator CW	K7VS	
Pacific Division		
QRP CW	W6JTI	Dennis Motschenbacher, K7BV
Low Power CW	N6NF	Robert A. Wilson, N6TV
High Power CW	W6GO (N6IG,op)	Richard Hallman, N7TR
Multioperator CW	K6RC	
Roanoke Division		
QRP CW	W2CS	Raleigh Amateur Radio Society
Low Power CW	WJ9B	Raleigh Amateur Radio Society
High Power CW	KT3Y	Potomac Valley Radio Club
Multioperator CW	W4RM	
Rocky Mountain Division		
QRP CW	WØUN (K9AN,op)	Ron Stark, KU7Y
Low Power CW	NØNR	
High Power CW	N2IC	Southern New Mexico DX Assn - WW5DX
Multioperator CW	KO7X	
Southeastern Division		
QRP CW	W4DEC	Bill Harding, K4AHK
Low Power CW	WP2Z (AG8L,op)	
High Power CW	K1TO	
Multioperator CW	N8PR	
Southwestern Division		
QRP CW	N7IR	Ray Day, N6HE and Donna Day, N6HTH
Low Power CW	AD6DO	Larry Serra, N6NC
High Power CW	K6LL	
Multioperator CW	N6VR	Warren Hill, K7WX
West Gulf Division		
QRP CW	KG5U	AZ ScQRPions
Low Power CW	K5RT	D. Craig Boyer, AH9B
High Power CW	K5GN	Leo E. Oyler, Jr, WØGOW—W5RO Memorial
Multioperator CW	AB5I	Young Gunners DX Foundation
Canada		
QRP CW	VE7CA	Chuck Adams, K5FO
Low Power CW	VE7CC	Don Haney, KA1T
High Power CW	VE2AWR	
Multioperator CW	VE3EJ	
Special		
Low Power Rookie CW	N7IF	Rob Kaufmann, VE4GV

Tougher Log Checking

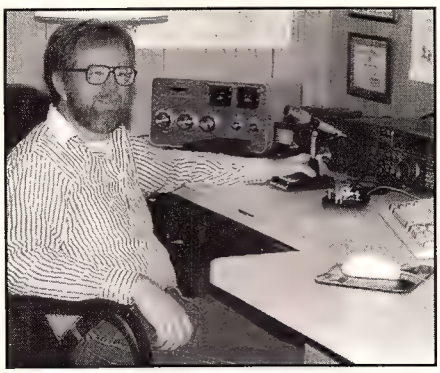
Accuracy is an important skill in contesting and this year it was a critical requirement for success. Log checking was the toughest in years with many entrants losing 20 or more contacts due to miscopied exchange information. Every log received undergoes a computer crosscheck for errors in call signs and exchanges. The log checkers noticed a disturbing increase in logging errors that were clearly caused by participants allowing their logging software to fill in information. Next year copy what was sent and take the time to ask for extra repeats if you are not sure of what you heard.

Regional Competition

The Top Five regional score boxes will help you compare your score to others in your area of the country. Each region consists of a combination of ARRL Divisions chosen for a "best fit" in terms of common geography or population.

In the Northeast, K1TR easily took the QRP race over K3CR and AD8J. The low power category was a New England affair—except for winner W2TZ in Western New York. K5ZD had his 20th year in a row over 1000 QSOs in beating rivals N2NT and K1AM. Multi-op went to the "Green Hornet," W3GH.

The Southeast suffered under some extremely severe thunderstorms on Saturday evening. This forced some stations off the air and made the low bands noisy for everyone. Even so, there was a close QRP race between N4UW and K5SL. Three of the region's low power entrants made the national top ten. WC4E finished just ahead of N4BP in a North Florida versus South Florida contest.



Ben, K9BF, was operating in the contest for the first time in many years. Ben said, "It was a lot of fun, and I'll see you next year."

The Central Region had its usual close competition. K9OM led the QRP class. K8BL, K9IG, and W8MJ all went to the wire for the low power title. K9DX beat the distinctive vanity call of WI9WI (Wisconsin of course!) for high power. The national top ten finishes of K8LX and W9JA dominated multi-op for the region.

The Midwest region is always the toughest. N5TJ smashed the QRP category. KØEU bested K5RT and NØNF for low power. K7CF and NØAT were just a few points apart for fourth and fifth place. All five high power regional winners also made the national top ten. KO7X took out ABØS for the multiop crown.

Out in the Western region, NØAX, K7MM and AA7KF battled for the QRP category. All five of the low power entrants made the national top ten. W6GO (N6IG opr) just barely got by K6LL for the top high power score. K6LL achieved his 13th year in a row with more than 1000 QSOs in SS CW. N7TR placed 11th nationally to come in a close third in the region. Multi-op saw K6RC get past N6VR and N6KI.

Scores

Within each section, scores are listed in descending order, by power categories, followed by multioperators. Line scores list call sign, score, QSOs, multipliers, hours, class (Q = QRP, A = Low Power, B = High Power). Division leaders are listed in **bold**.

CW

1

Connecticut

W1AW (W1VT,op)	78,736	518	76	24	Q
N1TM	49,392	343	72	24	Q
W1QK	29,946	217	69	15	Q
W1GM	25,864	212	61	13	Q
W1EQ	114,608	754	76	24	A
WA2GO	97,776	679	72	21	A
AB1U	62,700	418	75	24	A
K1KAV	48,138	339	71	24	A
NX1Q	27,520	215	64	7	A
K1STM	25,320	211	60	11	A
WA1LJD	25,254	207	61	11	A
K1JN	21,720	181	60	13	A
WB8IMY	20,496	168	61	8	A
N1TKS	19,276	158	61	24	A
AA1FK	19,152	171	56	24	A
N1HRA	7,812	93	42	24	A
KE1AU	1,620	30	27	3	A
KA1VMG/T	364	14	13	6	A
W1WEF	193,708	1226	79	24	B
KQ2M	176,960	1120	79	22	B
W1BIH	69,312	456	76	24	B
K1IN	60,356	382	79	14	B
N4XR	18,612	141	66	4	B
WS1F (+WA1PMA)	79,632	504	79	17	B
AK1N	19,750	125	79	15	B
N1MM	14,672	131	56	5	B

Eastern Massachusetts

K1RC	68,704	452	76	21	Q
W1MK	26,320	235	56	7	Q
WA1AW	6,612	114	29	7	Q
WA1QVM	4,514	61	37	12	Q
K1PLX	2,128	38	28	10	Q
K1VUT	146,016	936	78	24	A
WT1O	144,456	926	78	24	A
K1HT	140,146	887	79	24	A
N1BB	132,286	859	77	24	A
W1AF (KO1O,op)	103,050	687	75	22	A
K1XM	76,500	510	75	11	A
K1NTR	60,000	400	75	14	A
WZ1K	58,824	387	76	24	A
W1TE	53,878	341	79	15	A
K1CB	31,548	239	66	6	A
K1MC	31,088	232	67	16	A
K1SEC	26,496	207	64	6	A
W1KM	26,460	245	54	6	A
W1SRG (N1XYR,op)	22,750	175	65	16	A
W1CI	20,618	169	61	15	A
K1UCA	18,602	131	71	18	A
N1IBC	16,000	160	50	12	A
KQ1F	8,400	105	40	5	A
KE1HM	8,364	102	41	5	A
W1SR	2,184	39	28	2	A
K5MA	132,088	836	79	19	B
AA1HB	85,120	560	76	16	B
K1LU	75,600	504	75	14	B
W1AX	52,272	363	72	15	B
K1TH	50,718	321	79	10	B
WR1P	42,568	313	68	24	B
W1ZT	33,120	240	69	11	B
W1OHM	20,496	168	61	13	B
K1SM	5,562	103	27	3	B
W1XS	48,506	307	79	18	B
K1NU	32,032	208	77	24	A
WO1N	31,780	227	70	10	A
AD1C	11,550	105	55	2	A
W1FM (+N1SOH)	6,396	78	41	3	A

Maine

KX1E	73,200	488	75	23	A
N1WL	28,704	208	69	9	A
K1YCS	10,440	116	45	11	A
K1KF	6,600	100	33	8	A
N1MHB	1,280	32	20	6	A
W1AO	103,016	652	79	14	B
W1LEE	36,312	267	68	15	B
KR1B	12,604	137	46	8	B

New Hampshire

K1TR	125,096	823	76	24	Q
KA1O	77,184	536	72	22	Q
AA1CA	40,044	282	71	18	Q
KC1F	33,938	239	71	5	Q
W1XV	11,872	112	53	11	Q
NO1E	216	12	9	1	Q
WA1S	149,468	946	79	23	A
WA1LNP	142,674	903	79	24	A
K1VA	126,008	829	76	24	A
K1EPJ	95,748	606	79	22	A
K1LKP	32,240	248	65	13	A
AE1T	31,188	226	69	7	A
KD1AW	29,882	223	67	12	A
N1SNB	25,704	238	54	24	A
K1WD	20,618	169	61	10	A
K1RO	13,520	130	52	3	A
N1KWF	12,402	117	53	24	A
W1UN	2,576	46	28	2	A
WB1GEX	160	10	8	1	A
WC1M	70,224	456	77	10	B
K1OZ	34,914	253	69	17	B
AA1LN (+AA1SI)	79,000	500	79	18	B
K1GW	15,360	120	64	3	B

Rhode Island

KM1X	143,780	910	79	24	A
K1VSJ	39,368	266	74	10	A
K3IU	35,466	257	69	11	A
N9LYE	11,220	110	51	24	A
AB1BX	8,800	100	44	17	A
K1AM	194,498	1231	79	24	B
W1OP (W1GS,W1IUX,N1JDA,WA1UWU, K1DT,ops)	89,688	606	74	19	B
AA1II (+N1QVJ)	8,480	106	40	10	A

Vermont

W1EAT	72,600	484	75	21	Q
AA1PB	17,444	178	49	11	Q
W1ECH	122,450	775	79	22	A
N1RL	109,592	721	76	20	A
N1RJF	57,024	396	72	24	A
KK1L	45,012	341	66	20	A
WA1OLS	5,376	56	48	24	A
W1SA (+AB1T)	137,592	882	78	23	B

Western Massachusetts

W1PA	10,528	112	47	24	Q
KT1M	123,872	784	79	24	A
KZ1M	98,904	634	78	18	A
N1LN	54,384	412	66	16	A
K5ZD	204,136	1292	79	24	B

2

Eastern New York

KD2IX	408	17	12	24	Q
K2UF	111,188	722	77	21	A
K2YR	101,400	650	78	22	A
K2DW	81,900	546	75	23	A
K2GS	62,928	414	76	19	A
AA2WQ	54,720	360	76	19	A
AA2Y	40,936	301	68	14	A
N2CJJ	39,156	251	78	18	A
N2TY	39,060	279	70	24	A
N2LBR	37,200	300	62	18	A
W2PS	36,480	240	76	17	A
W2ZU	36,260	245	74	12	A
W2WC	33,496	212	79	24	A
W2EJG	32,996	226	73	13	A
W2XM	27,820	214	65	11	A
WD2K	23,400	180	65	15	A
KG2HK	22,736	203	56	13	A
N2SQW	18,468	162	57	14	A
K2RI	16,348	134	61	8	A
W2NRD	8,680	70	62	8	A
KW2D	8,480	106	40	5	A
KC2AFK/T	532	19	14	8	A
WA1KKM	112,784	742	76	22	B
W2GDJ	31,950	225	71	8	B
N1CC	27,720	220	63	4	B
K2ONP	27,612	234	59	5	B
KB2SSZ	7,980	105	38	12	B
NA2N (+KY2J)	166,374	1053	79	24	B
K2DS (+WA2JQK,AA2DY,AA2GD,AA9KT)	148,520	940	79	24	B
W2RE (+W2XL)	139,988	886	79	24	B
NO2X (+NN2V)	63,200	400	79	20	B
N2POS (+N2PEN,WB2FOB)	29,862	237	63	14	B
K2ZZ	16,590	105	79	15	B
KB2USV (+K2PC)	10,914	107	51	24	B

Northern New Jersey

KF2HC	43,550	325	67	20	Q
KB2SGM	6,048	72	42	17	Q
KF2EW	5,920	80	37	11	Q
N2NO	5,600	70	40	7	Q
NA2U	109,980	705	78	24	A
N2ED	83,550	557	75	17	A
WB2EZG	80,300	550	73	18	A
K2ZD	43,800	300	73	14	A
K2WA	36,846	267	69	17	A
W2VQ	35,642	251	71	11	A
WA2ASQ	29,150	275	53	18	A
W2LRO	25,488	216	59	10	A
KB2POP	17,340	170	51	24	A
N2WF	11,424	119	48	12	A
KG2LO	10,400	130	40	24	A
KC2BDH	10,340	110	47	18	A
KA2ANF	1,886	41	23	24	A
N2NYR	640	20	16	3	A
N2NT (N2NC,op)	202,488	1298	78	24	B
K5KG	134,142	849	79	22	B
W2UDT	22,050	175	63	5	B
WA2YBI	17,420	130	67	14	B
K2TW (+W2GD)	170,640	1080	79	24	B
N2KJM	89,744	568	79	19	A
N2JT	59,592	382	78	16	B
AJ2U	20,300	175	58	8	A
W2MY (+W2MBY/T)	11,832	116	51	9	A
W2YR	756	21	18	10	B

Northern New York

WZ2T	61,320	420	73	24	Q
N2JNZ/T	1,026	27	19	7	Q
NT2W	38,080	280	68	13	A
KA2SJG/N	5,940	90	33	24	A
K2NNY (K8FC,NG2P,K2CS,K2ZR,W2LB, K2DB,ops)	146,150	925	79	24	B

NYC-Long Island

W2XS	12,200	122	50	24	Q
N2TO	9,270	103	45	11	Q
W2LK	125,294	793	79	24	A
W2HLI	48,190	305	79	19	A
WA2PJI	28,400	200	71	24	A
WZ2S	28,098	223	63	15	A
N2VT	22,852	197	58	15	A
WA2MAV	22,620	174	65	10	A
K2HVN	15,972	121	66	7	A
W2KTF	13,104	126	52	24	A
WW2G	5,304	68	39	10	A
K2AU	80,340	515	78	17	B
N2GA	61,134	443	69	12	B
AA2FB	172,694	1093	79	23	B
K2QMF	64,780	410	79	13	A
WO2N	32,390	205	79	17	B

Southern New Jersey

N2OO	7,700	110	35	4	Q
K2HPV	5,950	85	35	7	Q
W2LYL	88,800	600	74	20	A
W2ESX	86,578	593	73	22	A
K2MK	50,172	339	74	9	A
WA2VQV	20,790	165	63	24	A
WB2KOH	5,896	67	44	24	A
N2MM	172,220	1090	79	24	B
AB2E	61,138	397	77	9	B
W2YC	112,970	715	79	23	B
W2RF	86,584	548	79	12	B
K2VT (+K2VS)	34,452	261	66	20	A
W2BE	6,240	60	52	12	B

Western New York

N2TPA	24,752	182	68	20	Q
K2SJB	14,536	158	46	20	Q
N2VPK	7,896	94	42	9	Q
NO2RP	6,804	81	42	6	Q
KF2JC	5,824	112	26	15	Q
KV2X	850	25	17	4	Q
W2TZ	159,432	1022	78	24	A
W2KA	114,076	722	79	20	A
NA2Q	92,554	601	77	21	A
KU2N	88,322	559	79	22	A
K2JL	71,136	456	78	24	A
AE2T	61,124	413	74	24	A
WA2EYA	60,952	401	76	18	A
WA2RZJ	60,000	400	75	24	A
N2QLV	42,778	293	73	19	A
KD2A	37,000	250	74	0	A
AA2VX	34,188	231	74	17	A
WE2Z	30,756	233	66	13	A
WB2WPM	30,192	204	74	0	A
WE2Y	22,910	145	79	15	A
W2FR	20,412	162	63	6	A
NA2X	14,112	144	49	6	A
N2UM	11,200	100	56	24	A
K1PY	3,840	64	30	24	A
WB2AIV	220	11	10	6	A
K2ZJ	177,276	1122	79	24	B
W6XR	173,160	1110	78	20	B
NJ2L	157,092	1007	78	21	B
N2CU	137,748	883	78	24	B
K2FU	103,272	662	78	20	B
W2LC	101,384	667	76	15	B
N2WK	53,352	351	76	10	B
W2FU	49,700	350	71	7	B
W2OMV	34,860	249	70	12	B
WB2YQH	21,280	152	70	5	B
KE2VB	19,032	156	61	6	B
K2SM	10,914	107	51	6	B
W2CM (K2BJ,WA2ISC,ops)	100,776	663	76	21	B
W2RW (+WB2KAO)	54,400	400	68	9	A
KC2AOZ (N2DEM,KA2CDJ,ops)	36,340	230	79	10	A
W2OY (W2HQ,W2OP,ops)	25,872	196	66	13	B

3

Delaware

W3DA	107,440	680	79	22	A
N8NA	87,248	574	76	12	A
N4MO/3	61,420	415	74	19	A
NY3C	13,056	136	48	4	A
W3PP	191,812	1214	79	24	B

Eastern Pennsylvania

K3AN	68,600	490	70	18	Q
KW3U	11,856	114	52	12	Q
WA3KWU	126,896	824	77	24	A
WY3A	117,648	774	76	24	A
KC3M	99,540	630	79	18	A
K3MQH	83,928	538	78	12	A
K2LNS	78,386	509	77	12	A
N2EY	67,592	476	71	21	A
W3BGN	56,942	401	71	8	A
W3AP	46,800	325	72	6	A
WT3P	45,880	310	74	24	A
N3NZ	35,604	258	69	22	A
K3ATO	32,368	238	68	8	A
K3KW	31,220	223	70	6	A
KE3MX	30,378	249	61	15	A
W3SD	25,420	205	62	7	A
N3RM	24,806	157	79	11	A
AG3G	24,684	187	66	16	A
WB3FAA	23,560	155	76	8	A
N3GUK	18,360	153	60	11	A
NU3Z	18,144	162	56	8	A
KB3BPS	11,200	112	50	5	A
K3CT	10,146	89	57	4	A
W3SSS	9,600	100	48	11	A
KR3I	9,450	105	45	5	A
WT3H	7,540	130	29	4	A
N3CZB	2,262	39	29	9	A
N3TRO	432	18	12	1	A
W3EFY	50	5	5	1	A
AA3B	164,736	1056	78	24	B
WF3T	150,732	954	79	22	B
K3TEJ	133,518	867	77	22	B
K3SV	126,558	801	79	20	B
AA3TT	125,800	850	74	20	B
K3WW	120,554	763	79	20	B
NB3I (+N3BNA)	105,702	669	79	19	B
W3OV	67,800	452	75	10	A
K3II	61,620	390	79	16	A
K2CD	16,748	106	79	10	
AK3TU (+KØSO)	9,030	105	43	3	B
NE3H	4,860	81	30	4	B

Maryland-DC

K3AJ	69,450	463	75	20	Q
K3TM	51,538	353	73	10	Q
N3GM	41,472	288	72	13	Q
WV3B	28,810	215	67	11	Q
W6TOY/3	22,080	160	69	24	Q
N3WK	17,400	150	58	16	Q
W3MWY	14,144	136	52	24	Q
W3MC	129,718	821	79	24	A
W2GG	101,178	657	77	20	A
KM3V	78,684	498	79	21	A
W3UJ	78,526	497	79	18	A
W3CB	48,764	334	73	24	A
W3SY	47,012	322	73	16	A
W3CP	40,612	286	71	14	A
WR3L	38,456	253	76	22	A
K3SA	34,000	250	68	5	A
NC3G	25,704	204	63	9	A
WA3EOQ	20,790	165	63	7	A
W3EE	16,524	153	54	8	A
K3HH	16,200	135	60	6	A
K3APM	12,544	112	56	6	A
WD3A	12,444	122	51	8	A
W8WEU	11,200	112	50	14	A
N3HUV	11,100	111	50	11	A
N3UN	10,976	112	49	7	A
N3YVW	4,290	65	33	17	A
W3DAD	850	25	17	1	A
N3YHC	828	23	18	8	A
K3MM	194,024	1228	79	24	B
KE3Q	191,180	1210	79	23	B
K3ZO	184,702	1169	79	24	B
N3OC	106,400	700	76	19	B
N3II	99,540	630	79	24	B
W3AZ	66,528	432	77	18	B
WB4FDT	55,572	421	66	13	B
W3GG	27,900	225	62	4	B
W3TMZ	5,184	81	32	24	B
W3GN	3,894	59	33	2	B
W3EKT	2,856	51	28	5	B
N3RR (+KT4W,K4VV)	115,024	728	79	24	B
K3DI	86,268	546	79	21	B
N3AM	81,686	517	79	12	B
W3EAX(NF3I,KD3FG,KF4UNA,N3UBM,ops)	80,550	537	75	24	A
ND3F	59,850	399	75	10	B
K3RA	46,240	340	68	7	A
WD3P	45,114	309	73	15	Q
NY3M (+ops)	41,748	294	71	11	A

Western Pennsylvania

K3CR (KB3AFT,op)	94,572	639	74	24	Q
AD8J	87,780	570	77	24	Q
K3WWP	69,300	450	77	23	Q
AA3GM	14,040	130	54	15	Q
WA3HAE	135,408	868	78	24	A
N3IXR	103,642	673	77	23	A
WA3SES	82,992	546	76	22	A
KA3JWJ	59,092	374	79	17	A
K3JE	51,192	324	79	24	A
W3IA	48,326	331	73	19	A
W3UA	40,592	344	59	24	A
NB4J	32,850	219	75	15	A
WA3MDY	27,450	225	61	15	A
WA3WAW	23,874	173	69	8	A
KB3A	16,830	153	55	24	A
N3YEA	11,934	117	51	17	A
KB3AZK/N	3,692	71	26	16	A
W3HDH	67,144	436	77	12	B
W3GH (+W9XR)	189,916	1202	79	24	B
WW3S	43,766	277	79	24	A
K3MD (+N3PUR)	35,360	260	68	12	B
KA3MYM	10,672	116	46	24	A

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Alabama

W4DEC	33,552	233	72	14	Q
KJ3V	22,540	161	70	24	Q
KC4TEO	62,016	408	76	14	A
K4IQJ	50,204	326	77	10	A
W4NTI	49,786	341	73	24	A
K2RUE	45,500	350	65	24	A
W4UTI	30,528	212	72	12	A
N4KH	27,548	194	71	13	A
WA4NAT	23,180	190	61	24	A
N4QB	8,858	103	43	3	A
K4AGT	8,836	94	47	7	A
K4JYO	1,776	37	24	2	A
K4NO	119,658	777	77	16	B

Georgia

AE4SS	27,648	216	64	13	Q
KØHT	15,228	141	54	16	Q
K4OGG	116,732	758	77	24	A
AA4GA	91,200	608	75	14	A
N8LM	80,080	520	77	19	A
K2UFT	54,312	372	73	10	A
KW4E	39,732	301	66	11	A
K4WZ	23,240	166	70	11	A
KE4ZQD	21,080	170	62	11	A
K4OM	19,600	140	70	14	A
KD3GC	18,240	160	57	14	A
W4KYW	17,822	133	67	24	A
KE4ZVF	380	19	10	24	A
W4SAS	140	10	7	2	A
W4AN (K7GM,op)	195,130	1235	79	24	B
K4BAI	174,876	1121	78	24	B
W4TM	120,238	761	79	23	B
N4XQN	20,636	154	67	10	B
W4WA	12,288	128	48	24	B

Kentucky

KC4WQ	35,242	263	67	10	Q
N4UL	90,850	575	79	24	A
KA8OKH	78,312	502	78	18	A
K4IE	38,778	281	69	24	A
KF8VS	27,860	199	70	11	A
AE4UK	27,588	209	66	19	A
K4WW	24,800	200	62	11	A
KO4OL	24,156	198	61	13	A
K4FU	19,118	121	79	9	A
KE4LIA	14,696	167	44	14	A
AE4RG	11,960	115	52	6	A
K4AT	11,440	110	52	9	A
AE4GH	10,800	108	50	9	A
K1AO	144,144	924	76	22	B
N4GN	118,580	770	77	21	B
N4XM	70,152	444	79	18	B
WB4PRU	45,080	322	70	24	B
K4LT (+W8RZ)	163,688	1036	79	24	B

North Carolina

W2CS	80,106	507	79	16	Q
WJ9B	144,570	915	79	24	A
NW6S	86,900	550	79	19	A
K4QPL	77,380	530	73	24	A
N2NFG	77,104	488	79	16	A
AC4ZO	68,766	471	73	15	A
WA4FFW	55,350	369	75	24	A
KS4S	33,110	215	77	22	A
W4WS (N4VHK,op)	14,500	145	50	10	A
KZ2I	14,400	150	48	7	A
NU4G	13,250	125	53	7	A
AD4IE	12,420	135	46	24	A
KQ4AV	12,296	116	53	16	A
W2VMX	11,730	115	51	6	A
K4PB	9,936	108	46	4	A
AE4EC	9,844	107	46	15	A
W4SI	7,912	86	46	14	A
KQ2V	7,828	103	38	3	A
W4AGI	4,148	61	34	3	A
KB4QAL	1,610	35	23	6	A
N4AF	178,382	1129	79	24	B
W4MR (AA4NC,op)	176,644	1118	79	24	B
N4CW	140,400	900	78	23	B
K2AV	43,946	301	73	8	B
NT4D (+WB8III)	130,900	850	77	24	B
K4MA	114,550	725	79	24	A
W4ATC (KO4PY,KF4ARS,N3QYE,ops)	100,804	638	79	24	B
W4ZYT (+W4SD,KC4VZK,W8RJL,AF4CD)	72,364	458	79	24	B
W4CQ (KM4GO,W4CC,ops)	23,140	178	65	11	A

Northern Florida

K4VFY	21,204	171	62	7	Q
WB8PAF	18,720	156	60	24	Q
NU4Y	112,266	729	77	19	A
K4LDR	80,008	548	73	22	A
K5WTA	14,190	129	55	0	A
KS4XN	10,120	110	46	13	A
WC4E	201,134	1273	79	24	B
N4EC	125,250	835	75	21	B
W4UE	92,114	583	79	21	B

Puerto Rico

WP4JXD	13,300	133	50	14	Q
NP3G	156,780	1005	78	23	B

South Carolina

W4OC	135,876	871	78	24	A
AA4NN	121,818	771	79	23	A
W8PC	87,016	596	73	24	A
N2FY	51,948	351	74	20	A
KB4GYT	25,122	159	79	24	A
K4DB	24,600	205	60	8	A
KS4DU	10,504	101	52	5	A
N4EE	2	1	1	1	A
W4BTZ	121,502	769	79	21	B
W4YDD	92,500	625	74	19	B

Southern Florida

KS4GW	1,092	26	21	23	Q
KN4T	176,170	1115	79	24	A
WD4AHZ	116,288	736	79	23	A
N4TO	51,800	370	70	7	A
W4LQO	43,200	300	72	10	A
W4OX	40,800	272	75	11	A
N4PSE	40,040	286	70	24	A
N4DL	22,082	181	61	10	A
KN4JN	13,872	136	51	13	A
WW1N	11,040	115	48	4	A
WB4IHI	10,656	111	48	10	A
KT4TD	1,584	33	24	17	A
W3DHN	1,426	31	23	4	A
K1TO	227,362	1439	79	24	B
N4BP	200,148	1283	78	23	B
K4LQ	59,280	390	76	17	B

K4OJ (+W1CW,W1YL)

	217,408	1376	79	24	B
N8PR	36,498	231	79	11	A

Tennessee

N4UW	90,324	579	78	24	Q
N4LT	10,900	109	50	7	Q
N4ZZ	177,276	1122	79	24	A
NA4K	158,312	1028	77	24	A
WO4O	128,232	822	78	24	A
N4DW	114,866	727	79	22	A
N4IR	105,386	667	79	24	A
N4CM	64,184	452	71	11	A
W4TYU	37,674	273	69	19	A
W4DAN	24,766	203	61	7	A
KE4OAR	14,382	141	51	12	A
KE4GYR	13,664	112	61	11	A
KT4OR	8,976	102	44	19	A
W4NI	2,912	52	28	3	A
W4PA	191,338	1211	79	24	B
K4RO	162,898	1031	79	24	
K0EJ	142,674	903	79	24	B
W9WI	125,972	818	77	24	B
K4LTA	122,772	787	78	24	B

W4CAT (K1KY,op)

	111,548	706	79	24	B
N4CT	32,864	208	79	18	B
K4AMC	32,026	239	67	5	B

WA4UCE (N4SCS,K9JA,ops)

	4,758	61	39	5	A

Virgin Islands

WP2Z (AG8L,op)

	183,300	1175	78	24	A
NP2L	51,380	367	70	19	A

KP2D (KP2N,NP2E,ops)

	32,000	250	64	7	A

Virginia

N4ROA	77,964	534	73	24	Q
K4GEL	36,432	276	66	17	Q
WR4I	17,388	138	63	13	Q
KA1DBE	4,960	80	31	22	Q
K1FR	1,628	37	22	2	Q
W2HD	18	3	3	1	Q
K4MX	121,352	788	77	24	A
W4YE	117,394	743	79	19	A
K4BAM	96,900	646	75	23	A
KB4CG	78,192	543	72	24	A
K4OAQ	74,444	503	74	17	A
K4UK	69,000	460	75	22	A
N3JT	60,952	401	76	7	A
K4SO	52,706	361	73	8	A
K5VG	51,750	345	75	21	A
K4FPF	50,560	320	79	15	A
N3OS	48,422	341	71	14	A
W4VG	47,700	318	75	16	A
K1SE	44,988	326	69	17	A
W2YE	38,352	282	68	15	A
N4MM	32,390	205	79	20	A
WD4ELJ	29,110	205	71	13	A
K4ORD	29,110	205	71	18	A
WB4ZPF	24,450	163	75	21	A
WA4DAI	23,940	190	63	9	A
KE4UKX	22,116	194	57	14	A
AE4EW	19,968	192	52	15	A
KK4R	18,582	163	57	6	A
W4VC	16,988	137	62	8	A
K4EC	16,854	159	53	7	A
W4DC	16,568	109	76	8	A
W4HM	15,900	150	53	5	A
KA4RLJ	14,400	120	60	7	A
WS8A	11,664	108	54	8	A
N6MW	10,952	74	74	10	A
N4ST	10,192	104	49	6	A
N3XT	8,652	103	42	4	A
K4ME	7,600	100	38	5	A
N4GU	6,162	79	39	4	A
N4BTO	4,650	75	31	5	A
K3SS	1,008	24	21	5	A
KD4NEM	442	17	13	5	A
AD4TJ	384	16	12	1	A
N3TG	180	10	9	1	A
KT3Y	190,864	1208	79	24	B
K4IQ	117,078	741	79	22	B
K4GMH	66,340	535	62	14	B
W4MYA	52,122	357	73	7	B
K4VV	37,700	290	65	24	B

W4RM (+W4NF,W4CE)

	164,794	1043	79	24	B

K4IX (+KO4NX,W4HIR,W4JLS,W4PRO)

	101,910	645	79	24	B
W4AU	100,330	635	79	24	A
WA4QDM	50,086	317	79	16	A
K3SW	17,680	130	68	24	B
AE4EF (+KS4IG)	14,762	121	61	18	A

K4KDJ (WA4DOX,KU4AG,KF4JFG,ops)

	11,424	112	51	9	B

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Arkansas

AB5SE	123,662	803	77	21	A
K5OY	119,350	775	77	23	A
KJ5WX	42,450	283	75	16	A
W5KL	13,720	140	49	4	B

Louisiana

K5SL	89,076	571	78	24	Q
K1DW	67,784	458	74	12	A
WA5JWU	62,678	407	77	17	A
KC5ZZ	35,712	279	64	19	A
W5ZDW	30,420	234	65	7	A
W5XV	28,152	207	68	13	A
N5SMQ	3,038	49	31	8	A

W5WMU (N6TR,op)

	229,100	1450	79	24	B

K5MC (+W5EW,WA5SXU)

	123,900	826	75	24	B
W5OT	55,594	361	77	13	A

Mississippi

KB5IXI	21,504	168	64	7	A
N5UE	14,160	118	60	13	A

K5MDX (WQ5L,KC5WCO,ops)

	192,760	1220	79	24	B

New Mexico

K5OI	3,468	51	34	24	Q
KT5X	122,766	777	79	15	A
N5UL	119,550	797	75	23	A
N5CU	10,682	109	49	9	A
KC5KEG	1,020	30	17	2	A

K7UP (KN5H,op)

	217,882	1379	79	24	B
W5JOV	13,440	120	56	4	B

North Texas

N5TJ	166,058	1051	79	24	Q

K5FO (at K5JP)

	80,100	534	75	22	Q
K5WO	66,528	462	72	24	Q
WD5ICQ	17,028	129	66	19	
W0CO	10,600	106	50	24	Q
K5RT	173,168	1096	79	24	A
WD5K	145,360	920	79	24	A
W5MYA	113,190	735	77	19	A
K5KJ	108,262	703	77	20	A
NN5T	104,364	669	78	21	A
K5PN	86,400	576	75	20	A
K8IT	84,064	568	74	18	A
W8FN	69,762	453	77	16	A
K5QX	44,250	295	75	13	A
WK5K	42,560	304	70	22	A
KN5L	34,224	248	69	20	A
N5LS	25,350	169	75	15	A
W5RYV	16,280	148	55	13	A
K6AZA	14,040	130	54	24	A
W5DLM	10,070	95	53	7	A
AA5WE	8,928	93	48	12	A
KC5NT	3,016	52	29	7	A
KM5IG	750	25	15	24	A

WX0B (NM5M,op)

	213,906	1389	77	24	B
K5RX	203,030	1285	79	24	B
NJ1V (at K5OW)	157,542	1023	77	24	B
K5LP	146,916	954	77	24	B
WB5B	111,568	734	76	16	B
W5FO	104,728	689	76	11	B
K5ZO	104,044	703	74	16	B
N5KM	65,728	416	79	14	B

WA5BU (K5LH,N5VHO,ops)

	88,858	577	77	24	A
N5KB (+WB5PUN)	11,766	111	53	14	B

Oklahoma

K5DP	22,400	175	64	10	Q
AA5CO	6,768	72	47	4	Q
K5KA	122,816	808	76	17	A
K8FU	79,950	533	75	23	
WD0GTY	23,482	199	59	16	A
K5CM	16,740	155	54	4	A
K5YP	13,158	129	51	24	A
N5KK	8,190	117	35	4	A
K2BA	160,056	1026	78	23	B
W5UDA	145,616	958	76	20	B
K5YAA	72,288	502	72	24	B
AA5HV	10,580	115	46	7	B

AB5I (+K5TT,KJ0W)

	140,936	892	79	24	B

South Texas

KG5U	110,048	724	76	24	Q
W5TFB	88,950	593	75	24	Q
AF5Z	40,572	294	69	10	Q
K5ZTY	20,636	154	67	15	Q
W5MJ	11,392	89	64	24	Q
KD5KP	11,024	106	52	11	Q
WA8GHZ	7,728	84	46	8	Q

KD5BXQ (KG5YA,op)

	1,026	27	19	2	Q
N5TU	153,368	1009	76	24	A
N5RP	111,496	724	77	18	A
K5NZ	104,208	668	78	24	A
AC5K	104,104	676	77	18	A
W5RQ	95,788	622	77	21	A
W5IX	66,748	451	74	13	A
AJ4F	60,088	406	74	16	A
KA5KLU	39,476	278	71	15	A
WX5I	34,408	253	68	17	A
WD5N	29,376	216	68	24	A
WC5D	27,200	200	68	8	A
K5CWR	21,252	154	69	24	A
W5RPJ	13,664	122	56	24	A
KZ5E	10,812	106	51	15	A
W5AHC	9,792	102	48	6	A
NX5M	8,600	100	43	3	A
K5GN	216,934	1373	79	24	B

K5BN (K5GA,op)

	216,618	1371	79	24	B
N5KO	212,036	1342	79	24	B

N5JA (N1RR,op)

	207,296	1312	79	24	B
K5NA	198,448	1256	79	24	B
K5YA	198,056	1303	76	24	B

K5TR (at W5KFT)

	193,908	1243	78	24	B
N5DU	185,018	1171	79	24	B
W5ASP	182,490	1155	79	24	B
W5XD	155,952	1026	76	23	B
N5LZ	134,300	850	79	16	B
KT5I	97,674	669	73	22	B
K5DX	29,952	208	72	24	B
W5NR	12,200	122	50	24	B

N5XU (AA5BT,KA5WSS,ops)

	103,748	701	74	17	B

WA5SNL (+WX5DX,N5LO,N5OB,K5IUA, WA5DR,KF8ZN,N5QWF,KB5ROS,K5QLP)

	65,416	442	74	24	A

N8ECG (+KD5AYY,KA5KQZ)

	17,100	150	57	20	A
KZ5MM	4,788	57	42	4	B

West Texas

N5DO	151,998	987	77	24	A

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East Bay

W6JHB	37,100	265	70	18	Q
W7DR	81,906	561	73	19	A
W6RGG	65,416	442	74	11	A

W6G (WB6DSV,op)

	17,920	160	56	3	A
K6BXD	13,824	128	54	8	A
K6CSL	12,800	128	50	15	A
K7CO	4,992	64	39	8	A
N6RO	196,560	1260	78	24	B
N6DA	153,824	1012	76	22	B
W6BSY	140,400	900	78	23	B

K6ZM (K6WG,op)

	60,600	404	75	11	B
W6GPM	52,950	353	75	24	B
KM6F	12,138	119	51	8	B

Los Angeles

W6LX	53,352	351	76	19	Q
N6GA	14,248	137	52	6	Q
N6KZ	5,852	77	38	5	Q
K6LA	168,744	1068	79	24	A

K6RO (KC6X,op)

	163,056	1032	79	24	A
W6KC	95,152	626	76	19	A
N6GL	67,032	441	76	23	A
W3SE	60,900	406	75	22	A
N5BF	55,024	362	76	24	A
WA7BNM	41,860	299	70	8	A
N9KFL	36,408	246	74	13	A
WA6BIL	35,358	249	71	10	A
K6ZCL	15,620	142	55	15	A
K6TV	6,804	81	42	9	A
N6XJG	2,322	43	27	7	A
N6TCZ	112	8	7	2	A

KN6DV (K0DI, op)

	191,496	1212	79	24	B
KQ6ES	51,246	351	73	22	B
N7KFL	36,408	246	74	13	B
W6SX	13,000	125	52	2	B

W6UE (KA6SAR,N6ET,N6VI,W4EF/6, W6EJJ,ops)

	155,064	994	78	23	B
W6SW	42,560	304	70	9	A

Orange

KI6SN	2,500	50	25	6	Q
AD6DO	179,172	1134	79	24	A
AA6PW	132,240	870	76	24	A
W1HIJ	72,450	483	75	24	A
W6TKV	57,256	421	68	17	A
W6ZL	37,488	284	66	24	A
K6PB	24,800	200	62	15	A
K6HRT	24,400	200	61	8	A
N6RT	21,280	140	76	5	A
K6WS	20,584	166	62	6	A
W6NT	18,792	162	58	18	A
WA6RND	16,240	145	56	10	A
KI6X	10,094	103	49	5	A
WA6GFR	704	22	16	6	A
KE6YQM	120	12	5	1	A
N6HC	139,988	886	79	22	B
K6NR	91,784	596	77	20	B
K2PLF	38,350	295	65	8	B
N6ER	36,168	274	66	5	B
W6HT	8,774	107	41	5	B

AC6RM (+KF6HQC)

	12,300	123	50	10	A

Pacific

WB6FZH/KH6	1,020	30	17	24	Q

KH6ND (at KH6R)

	182,648	1156	79	24	B
AI6V	108,376	713	76	24	B

Sacramento Valley

KO6CX	1,728	36	24	9	Q
K6PU	143,148	906	79	18	A
K6A (K6PU,op)	143,148	906	79	18	A
N6KD	88,764	569	78	20	A
W6NKR	61,050	407	75	16	A
K6BPB	53,290	365	73	20	A
W6RFF	35,074	247	71	10	A
KI6IV	14,472	134	54	8	A

W6GO (N6IG,op)

	217,724	1378	79	24	B
W6EU	120,554	763	79	15	B
K6FO	75,088	494	76	21	B
KI6T	32,760	234	70	9	B
K6RC	175,696	1112	79	24	B
N6ZS	166,532	1054	79	23	B

K6RCC (K6OM,K6GV,AA6WJ,ops)

	162,266	1027	79	24	B
K6SG	62,160	420	74	16	B

San Diego

W6JVA	45,732	309	74	16	Q
W6JXA	10,080	105	48	9	Q
W6KY	147,264	944	78	21	A
N7CW/6	109,668	703	78	22	A
WN6K	100,100	650	77	23	A
AA6EE	45,440	320	71	11	A
K6VRS	20,740	170	61	15	A
K6VWL	12,054	123	49	13	A
K6NA	200,818	1271	79	24	B
W6MVW	101,232	666	76	24	B
K6CT	72,200	475	76	17	B
WB6FHK	60,000	400	75	19	B

N6KI (+KM6SN,N6NC,K6AM,WB6NBU, WB9COY)

	170,008	1076	79	24	B

San Francisco

W6JTI	91,784	596	77	24	Q
WN6W	26,248	193	68	15	Q
N6ZFO	95,456	628	76	22	A
N6YEU	70,668	453	78	4	A
K6UM	44,660	290	77	13	A
WA6CTA	142,674	903	79	22	B

W6BIP (+W6CT,AE0M)

	150,574	953	79	24	B

K6ANP (+K6LRN,N6AD)

	127,664	808	79	24	B
N6AI (+KE6SLS)	25,010	205	61	24	B

San Joaquin Valley

K6GPB	10,234	119	43	11	Q
NK6F	45,140	305	74	19	A
KN6YD	13,464	102	66	8	A
N6EE	10,600	106	50	4	A
N6YMM	3,828	58	33	6	A
N1CJ (W6XK,op)	1,476	41	18	2	A

N6MU (at N6NB)

	184,386	1167	79	24	B
K6ZZ	161,950	1025	79	24	B
W6UDX	33,366	249	67	16	B

KT6RA (+KD6KKP)

	94,168	596	79	18	B

Santa Barbara

W6GL	58,674	381	77	22	Q
WA6FGV	133,364	866	77	24	A
K7SDW	10,752	112	48	8	A
KA6WZR	4,620	66	35	7	A
KQ6NO	1,976	38	26	9	A
W6TKF	125,136	792	79	21	B
W7CB/6	56,472	362	78	9	B

N6VR (+AC6T,AD6C)

	171,272	1084	79	24	B

W6HU (W6GL,W6LX,KF6KQL,ops)

	87,010	565	77	24	A

W6BHZ (KD6YNG,KN6MV,N6DE,N6NL, ops)

	73,852	499	74	23	A

Santa Clara Valley

N3ZZ	76,538	497	77	24	Q
W6IO	73,458	477	77	22	Q
WQ3B	9,152	104	44	10	Q
N6NF	164,626	1069	77	24	A
W6YL (AD6E,op)	105,028	682	77	16	A
W6PLJ	43,632	303	72	11	A
K7JJ	42,160	310	68	24	A
N6PT	41,736	282	74	18	A
K6PUD	38,760	285	68	15	A
WB6IYS	29,680	212	70	19	A
W6ISO	27,880	205	68	5	A
WD6DX	25,830	205	63	12	A
W9MAK	23,400	180	65	6	A
NU6I	22,816	184	62	12	A
N6NZ	22,196	179	62	15	A
W6PRI	13,260	130	51	24	A
W6WS	2,852	46	31	24	A
N6MNZ	480	16	15	12	A
KF6IIU/T	18	3	3	10	A
W6NL	202,714	1283	79	24	B
K6AW	193,392	1224	79	24	B
N6TV	190,164	1219	78	24	B
N6NT	187,862	1189	79	24	B
AE6Y	177,562	1153	77	24	B
N6TU	164,320	1040	79	24	B
NI6T	154,524	978	79	24	B
W0YK	136,344	874	78	17	B
K6XX	122,134	773	79	21	B
K6RB	116,886	759	77	19	B
N6ZB	103,026	669	77	23	B
K6GT	101,400	650	78	20	B
N7TN	76,220	515	74	8	B
AJ6V	75,000	500	75	13	B
KA6W	71,592	471	76	15	B
AD6AY	38,624	272	71	22	B
K6III	18,176	142	64	7	B
AA6W	16,874	143	59	10	B
W6CF	9,744	116	42	2	B
W6OAT	73,720	485	76	23	B
W6ISQ	48,822	309	79	9	B
AK6L	37,392	246	76	19	A
KD6NOS	35,668	241	74	19	A

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Alaska

KL7WP	59,584	392	76	18	A
KL7FAP	64	8	4	1	A
KL7AC	55,752	404	69	15	B

WL7KY (+KL7FH)

	76,788	486	79	15	B
KL7TS (+KL5T)	36,046	269	67	24	B

Arizona

N7IR	93,300	622	75	24	Q
NQ7X	15,720	131	60	13	Q
W5VBO	12,288	128	48	9	Q
KI7MN	2,436	42	29	7	Q
K7OX	159,904	1052	76	24	A
W7ZMD	115,908	743	78	16	A
W7YS	101,244	649	78	21	A
KB7RYU	80,500	575	70	22	A
K7ON	71,148	462	77	24	A
NN7A	70,994	461	77	18	A
W9CF	50,250	335	75	24	A
AB7II	46,428	318	73	11	A
N7JXS	42,090	305	69	13	A
KD4HXT/7	32,208	244	66	17	A
KE4EWI/7	29,614	221	67	24	A
N7DZ	25,740	198	65	8	A
KJ7WY	16,632	154	54	18	A
W2HTX	16,226	133	61	8	A
K7NX	12,650	115	55	9	A
N7RD	12,054	123	49	6	A
W7ZT	10,528	112	47	11	A
KI7LS	3,990	57	35	24	A
K6LL	217,566	1377	79	24	B
N7IX (+NE9Z)	26,788	181	74	14	A

Eastern Washington

K7MM	106,650	675	79	24	Q
W7GB	9,000	100	45	3	Q
K7BFL	2,976	48	31	2	Q
K7FR	173,404	1126	77	24	A
W7WMO	64,094	439	73	14	A
K7IOO	11,100	111	50	6	A
W3AS	7,654	89	43	2	B

Idaho

AB7TK	13,310	121	55	17	Q
W7QDM	2,808	52	27	2	Q
K7NHA	97,950	653	75	20	A
KK7A	32,500	250	65	8	A
KJ4FE	32,200	230	70	19	A
WA0DYU	41,496	273	76	24	B

W7UQ (KC7YVK,KI7RO,ops)

	18,360	170	54	24	A

Montana

AB7CE	15,372	122	63	20	Q
K7BG	184,860	1170	79	24	A
KC7MZT/T	1,976	38	26	14	A
KS7T	104,120	685	76	23	B

Nevada

KU7Y	86,394	561	77	24	Q
W1AB	50,400	336	75	24	A
N7IF	27,588	209	66	16	A
N7TR	215,828	1366	79	24	B

K5RC	75,450	503	75	9	B
AA0CY	52,514	341	77	13	B
W7UNR (KJ7YT,WA2FDK,K7VY,ops)	1,064	28	19	7	A

Oregon

AA7KF	105,490	685	77	24	Q
W7YAQ	97,736	643	76	24	Q
AA7CP	86,184	567	76	24	A
K7PJT	52,950	353	75	19	A
W7WHY	48,396	327	74	16	A
KU7K	20,956	169	62	9	A
N7VS	18,256	163	56	11	A
AA7LE	2,652	39	34	24	A
K7GX	128	8	8	1	A
W2VJN	189,758	1201	79	24	B
W7GG	163,488	1048	78	20	B
W7HWR	60,300	402	75	12	B
W7TQ	58,752	408	72	7	B
KI7Y	40,896	284	72	7	B
KQ7I	15,900	150	53	4	B
K7VS	158,948	1006	79	23	B
K7FD (+N7SG)	21,646	137	79	12	B

Utah

NC7W	54,000	375	72	12	Q
K7CF	159,896	1012	79	24	A
WA7HQD	58,788	426	69	24	A
KE7NS	47,656	322	74	24	A
W7HS	38,766	273	71	22	A
AA7TR	3,180	53	30	5	A
AF7O	72,842	473	77	24	B
K8EI	67,306	461	73	18	B
KO7X (+W7CT,K7VYY)	203,346	1287	79	24	B

Western Washington

N0AX	114,660	735	78	24	Q
KX7L	60,680	410	74	20	Q
WA2OCG	10,800	108	50	24	Q
WB7AEI	2,184	42	26	3	Q
K7ED (WA0RJY, op)	88,704	576	77	24	A
W7QN	75,774	519	73	17	A
AA7VG	67,744	464	73	24	A
W7LD	57,962	397	73	24	A
KN7T	51,240	366	70	24	A
N7WA	47,704	356	67	18	A
W7POE	34,560	270	64	10	A
NG7C	32,340	231	70	24	A
N7LE	21,952	196	56	10	A
KK7JP	21,492	199	54	13	A
K6KR	20,538	163	63	7	A
K7GDN	16,092	149	54	12	A
WZ7O	12,430	113	55	24	A
KD7LJ	7,568	88	43	8	A
KA7KUZ	4,686	71	33	16	A
KC7SSN	2,904	44	33	13	A
AB7RK	200	10	10	24	A
W7RM	203,424	1304	78	24	B
N6MZ	171,430	1085	79	24	B
N7LOX	148,668	953	78	24	A
W7OM	118,816	752	79	18	B
AB7RW	48,450	323	75	18	B
WL7E/7	16,524	162	51	24	B
W6JL	14,672	131	56	24	B
K7SS	13,356	126	53	2	B
N7DOE	10,058	107	47	9	B
K7NPN	107,312	706	76	19	A
K7NWS (AB7NW,WB7AEI,ops)	47,610	345	69	22	A
KK7GW (+KC7DZZ)	19,000	190	50	24	A

Wyoming

AE0Q	87,756	618	71	21	Q
W7CA	12,250	125	49	4	A

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Michigan

W8RU	88,160	580	76	24	Q
K8XXX (K8AQM,op)	79,560	510	78	22	Q
K8DD	60,198	381	79	14	Q
K8ZAA	42,600	300	71	23	Q
K8CV	40,064	313	64	24	Q
K8LJQ	39,274	269	73	23	Q
WA8RXI	26,004	197	66	6	Q
N8JM	12,688	122	52	10	Q
W8MJ	159,738	1011	79	24	A
WA8RRR	139,620	895	78	24	A
K8SB	116,850	779	75	24	A
K8RDJ	73,438	503	73	19	A
K8GT	72,206	457	79	20	A
WA8YPY	60,450	403	75	21	A
W8TJQ	59,360	424	70	17	A
K8SIA	53,424	371	72	24	A
WD8S	50,820	330	77	17	A
W8GVU (N8PPQ,op)	46,136	316	73	24	A
K8LJG	42,600	300	71	11	A
W8UMP	41,300	295	70	14	A
KG8W	41,272	308	67	14	A
W8EGI	37,380	267	70	10	A
KD8WV	33,120	276	60	22	A
N8NX	32,760	260	63	9	A
W8JJ	32,116	217	74	14	A
W8KZM	31,490	235	67	9	A
W8UE	31,222	233	67	11	A
N8MR	30,498	221	69	18	A
K8KU	29,832	226	66	9	A
N8VEN	26,712	212	63	21	A
N8TDE	25,344	198	64	18	A
NX8K	24,640	220	56	15	A
KB8HGM	21,930	215	51	15	A
K8JV	21,450	165	65	8	A
K8AI	17,516	151	58	9	A
W8DBH	13,440	120	56	10	A
WA8FRD	13,208	127	52	10	A
N8ZFH	13,200	150	44	18	A
N8MG	11,500	115	50	7	A
W8IZS	11,500	125	46	6	A
N8JG	9,660	105	46	24	A
KF8RG	7,650	85	45	24	A
WA8RD	6,164	67	46	11	A
KA8GOM	1,000	25	20	24	A
W8WQ	576	18	16	8	A
KB8SLD	528	22	12	3	A
AA8SN	240	12	10	24	A
W8ROS	90	9	5	2	A
W8RC	147,896	973	76	24	B
W8AAX	41,172	282	73	10	B
W8QS	10,404	102	51	8	B
K8LX (N8EA,WA8ZDT,ops)	197,974	1253	79	24	B
K8JM (+K8MM)	150,732	954	79	21	B
AA8TC	44,398	281	79	19	A
N5XHT	11,832	102	58	13	A
W8YY (N8TYP,KI8DL,ops)	3,960	60	33	13	A

Ohio

WA8RJF	79,952	526	76	23	Q
N8ET	50,224	344	73	24	Q
K8OUA	38,860	290	67	18	Q
WB5QVN	27,450	225	61	24	Q
WZ8P	19,800	180	55	10	Q
WB6JBM/8	8,160	102	40	9	Q
K8BL	162,740	1030	79	24	A
KU8E	148,824	954	78	24	A
K8DX	130,872	861	76	24	A
W8KIC	128,296	812	79	20	A
W8CAR	128,232	822	78	24	A
N8AA	118,500	750	79	15	A
W8UPH	95,152	626	76	24	A
WA8YRS	93,480	615	76	21	A
W8EDU (AF8A,op)	90,900	606	75	20	A
WA8RCN	67,760	440	77	15	A
W8JGU	60,514	383	79	12	A
ND8L	51,012	327	78	15	A
W8BD	50,076	321	78	24	A
WT8P	45,724	322	71	17	A
AA8PJ	45,152	332	68	15	A
NW4G	39,712	272	73	11	A
W8PN	39,050	275	71	11	A
AF8C	34,848	242	72	16	A
KB8GAE	33,810	245	69	12	A
KB8NTY	28,288	221	64	8	A
W8DHG	27,300	195	70	10	A
N8CO	25,132	206	61	11	A
NS8O	24,424	172	71	8	A
W8FAX	23,460	170	69	11	A
W8VQI	21,952	196	56	11	A
AA8OY	21,248	166	64	10	A
AF8A	13,500	125	54	5	A
W8WTS	11,858	121	49	4	A
W8VE	11,136	116	48	4	A
N8ATT	11,040	115	48	8	A
AA8KK	9,828	117	42	7	A
KF8UN	9,202	107	43	20	A
KG8BQ	7,956	102	39	5	A
K8VUS	4,368	56	39	17	A
N8WS	3,604	53	34	24	A
W8KH	2,752	43	32	7	A
K8NI	2,100	42	25	3	A
KF8TM	80,560	530	76	24	B
K8CX	63,200	400	79	9	B
K8MR	55,772	382	73	5	B
K8RM (K8MR,op)	51,262	361	71	6	B
AC8E (K8MR,op)	44,496	309	72	5	B
W8AJ	42,000	300	70	6	B
W8AJ (K8MR,op)	42,000	300	70	6	b
N8TR (K8MR,op)	33,976	274	62	4	B
K5ZG	25,620	210	61	24	B
W8AV	118,500	750	79	18	B
N8CPA (+KC8HYI)	33,696	234	72	18	A
W8CCI (AA8HH,W8KJ,W8KVU,K8TCR, KB8HGY,AA8MC,KA4WRR,KC8FUZ, KC8CKW,ops)	28,598	181	79	24	A
W8XD	12,482	79	79	8	A
K8MFO	12,482	79	79	6	A

West Virginia

W8DL	59,280	390	76	22	Q
WA8WV	125,202	813	77	22	A
KG8GW	65,120	440	74	24	A
KJ8J	38,088	276	69	20	A
N8YYS	34,086	247	69	24	A
W8NR	23,140	178	65	16	A
K8SX	12,556	146	43	10	A
N4ZR	165,516	1061	78	24	B
K3JT	150,228	963	78	24	B
W9LT	146,172	937	78	22	B
N8II	138,528	888	78	15	B
K8KFJ	45,696	336	68	9	B
W8ZA	37,536	276	68	15	B
W8PT	16,200	108	75	16	B
AA8UL (+WA8KAN)	15,510	141	55	24	A

9

Illinois

K9OM	95,000	625	76	22	Q
K9TR	156,262	989	79	24	A
WA9TPQ	137,984	896	77	24	A
K9UIY (at WB9Z)	136,812	877	78	24	A
K9WA	121,680	780	78	24	A
N9IJ	102,700	650	79	24	A
W9OF	101,278	641	79	20	A
WD9GGY	88,164	558	79	22	A
AA9D	87,984	564	78	20	A
N2CKZ	85,644	549	78	24	A
N9JF	83,550	557	75	24	A
W9IL	66,360	420	79	16	A
K9KJ	65,408	448	73	24	A
K9SB	55,944	378	74	18	A
W9RM	53,700	358	75	13	Q
NA9I	46,656	324	72	13	A
KJ9O	46,080	320	72	10	A
W9ZV	44,198	287	77	24	A
WB9UGX	42,240	320	66	16	A
K9BF	40,328	284	71	21	A
KF9D	39,274	269	73	6	A
WD9CIR	39,200	280	70	17	A
N9MSG	38,624	272	71	19	A
N9YXA	36,716	274	67	24	A
W9MYY	36,180	270	67	20	A
AK9Y	34,952	257	68	17	A
K9PPW	31,680	240	66	8	A
K7QQ	29,388	186	79	24	A
W9LNQ	29,200	200	73	8	A
W9QA	27,264	213	64	24	A
W9ZEN	25,074	199	63	12	A
KE9EX	19,536	148	66	11	A
W9AX	18,408	156	59	11	A
AA9KH	17,500	125	70	15	A
WA9FBC	16,728	123	68	11	A
W9FXA	16,170	147	55	7	A
K9AHH	14,000	140	50	11	A
K9CC	10,600	100	53	2	A
AA9NF	10,080	105	48	5	A
N9TMU	9,520	119	40	18	A
W9TM	8,132	107	38	4	A
W9VU	8,000	100	40	1	A
KY0Q	7,488	104	36	7	A
KW9I	1,320	33	20	7	A
WA9WXC	448	16	14	6	A
K9DX	189,916	1202	79	24	B
K9BGL	141,884	898	79	24	B
KI9A	120,620	815	74	24	B
K9BG	79,790	505	79	10	B
K9UQN	55,200	400	69	14	B
K9MOT (K9RR,op)	45,500	325	70	12	B
K9NR	16,704	144	58	4	B
K9HUH	15,738	129	61	18	B
KG9N	10,396	113	46	0	B
WE9A	1,218	29	21	3	B
WO9S (+AB4RL)	112,496	712	79	23	B
W9DA (KB9KTC,W9YO,ops)	57,450	383	75	24	A
N9LCR (+N9LCX,N9YSE,N9RUC)	9,328	106	44	19	A

Indiana

W9DZ	23,400	180	65	14	Q
W9FHA	20,916	166	63	24	Q
WA9SLM	16,874	143	59	18	Q
K9IG	160,054	1013	79	23	A
W9UR	109,200	700	78	19	A
NJ0U	85,410	585	73	22	A
W9AU	75,750	505	75	15	A
W9WJU	66,576	456	73	17	A
K9JWI	62,250	415	75	17	A
K7CK	52,500	350	75	20	A
K9WX	38,502	279	69	17	A
N9FD	35,604	258	69	8	A
K9KI	32,026	239	67	13	A
WA0JTL	29,232	203	72	14	A
KC9TV	25,172	203	62	24	A
KF9UP	20,292	178	57	17	A
K9VV	17,900	179	50	24	A
W4WQD	13,440	140	48	14	A
N9VT	11,600	116	50	24	A
WA1MKE/9	3,816	53	36	5	A
KE9I	146,308	926	79	24	B
W9RE	76,000	500	76	24	B
K9RU	12,480	130	48	6	B
W9YB (AD4OS,op)	8,800	100	44	5	B
N9PW	30,672	216	71	24	A

Wisconsin

N9NE	32,500	250	65	8	Q
W9LO	21,594	183	59	15	Q
WD9IAB	18,032	161	56	20	Q
WA1UJU	112,328	739	76	24	A
N9CIQ	112,022	709	79	21	A
N9UA	89,320	580	77	24	A
W9MSE	78,156	501	78	19	A
WW9DX (K9NW,op)	59,760	415	72	10	A
W9XT	43,800	300	73	8	A
N9TD	27,090	215	63	11	A
AA9RR	25,600	200	64	16	A
AA9FW	25,220	194	65	15	A
W9FBC	23,760	198	60	11	A
AA9BJ	21,960	180	61	7	A
W9FL	17,802	129	69	15	A
W9WUU	16,936	146	58	24	A
K9IA	16,764	127	66	9	A
K9NW	12,482	79	79	8	A
KB9AMG	11,424	112	51	13	A
N9PBM	1,260	42	15	12	A
WI9WI	163,086	1059	77	24	B
WT9Q	159,120	1020	78	24	B
W9CO	127,984	842	76	24	B
W8LQ	117,624	754	78	24	B
NE9U	12,482	79	79	24	B
W9JA (WE9V,K9PG,ops)	195,920	1240	79	24	B
K9MMS (+K9LU,K9JE)	132,088	836	79	24	B
K9OSH	20,296	172	59	24	A

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Colorado

WØUN (K9AN,op)	137,214	891	77	24	Q
KF7MD	38,482	271	71	13	Q
K1EQA	16,912	151	56	16	Q
NØZA	6,612	87	38	3	Q
ABØCD	5,330	65	41	24	Q
KIØG	2,400	50	24	5	Q
KØSU	672	21	16	24	Q
KØEU	190,008	1218	78	24	A
NØNR	166,296	1066	78	24	A
KØMF	130,130	845	77	24	A
KGØDS	94,088	619	76	23	A
WØLQ	54,316	367	74	18	A
N4VI	50,232	364	69	12	A
WØZA	45,260	310	73	14	A
W9KV	14,300	130	55	7	A
WBØHZL	9,776	104	47	9	A
N2IC	229,416	1452	79	24	B
KJØG (+KØSX,WØUAT,KØGAS)	142,896	916	78	24	B
KØTTT (WØMU,WBØIWL, ops)	26,500	250	53	24	B

Iowa

WØEJ	34,170	255	67	9	Q
NØAV	158,790	1005	79	24	A
NØAC (at WØFLS)	128,282	833	77	24	A
AH7W	108,680	715	76	24	A
NUØQ	97,432	641	76	24	A
KCØXK	49,284	333	74	20	A
NEØP	40,296	276	73	21	A
KEØFT	33,180	237	70	14	A
WØOF	30,736	226	68	17	A
KØINR	28,950	193	75	17	A
AAØAI	15,656	103	76	17	A
WØJTC	12,960	120	54	8	A
KØRX	137,302	869	79	21	A
WAØKHF (ADØH,AA9RK,KB4SBY,ops)	340	17	10	2	A

Kansas

AAØFO	87,934	571	77	15	A
WØUY	72,072	468	77	20	A
KØRY	32,700	218	75	16	A
KE4FDP	21,692	187	58	16	A
KAØRNY	21,476	182	59	15	A
WØYRN	18,720	144	65	13	A
KDØG	16,642	157	53	13	A
KUØKU	12,544	128	49	14	A
KGØUA	11,224	122	46	7	A
WØWPL	4,800	60	40	5	A
ACØE	3,240	54	30	10	A
NIØS	950	25	19	4	A
KØWA	76,752	533	72	12	B
ABØS (+KØWA,WØCEM)	188,136	1206	78	24	B

Minnesota

NØUR	92,554	601	77	24	Q
W3FAF	63,364	434	73	14	Q
WØYHE	12,288	128	48	9	Q
NØAT (NØKK, op)	159,744	1024	78	24	A
KBØO	141,884	898	79	24	A
WØPI	90,000	600	75	15	A
WØZQ	82,288	556	74	15	A
WA2MNO	74,000	500	74	21	A
KØPC	70,200	468	75	21	A
WAØBNX	43,400	310	70	18	A
WCØR	38,808	308	63	6	A
KØJA	32,558	223	73	12	A
KØJE	31,240	220	71	14	A
NØBM	26,664	202	66	7	A
NØHJZ	18,126	159	57	8	A
WØMN	12,838	131	49	24	A
WAØWOV	12,480	120	52	7	A
NØXTN	10,920	105	52	13	A
KØIHG	1,974	47	21	1	A
KCØBZN	50	5	5	5	A
KØAD	155,540	1010	77	24	B
WØHW	154,770	1005	77	24	B
KØHB	124,956	801	78	22	B
K9WIE	56,440	415	68	9	B
NØIJ	39,520	304	65	4	B
WA2HFI	11,984	107	56	7	B
KTØR (+KØOB,KØMX)	172,536	1092	79	24	B
NF9K (+WØORZ)	35,190	255	69	13	B
WØNE(+NØJP,KØNY,KFØUK,KBØSAA,KBØRGU)	10,486	107	49	16	A

Missouri

NØEID	36,018	261	69	18	Q
KCØM	13,200	120	55	24	Q
WB4RDV	70,128	487	72	21	A
NØSS	65,808	457	72	10	A
WAØIYY	63,948	438	73	16	A
KØGN	63,000	420	75	20	A
KØCA	35,140	251	70	6	A
KBØPTE	21,712	184	59	14	A
NSØB	21,000	175	60	24	A
KAØP	15,960	140	57	5	A
KBØQQF	9,752	106	46	11	A
WXØG	9,450	105	45	10	A
WBØFVK	3,038	49	31	14	A
KBØYXP/T	2,250	45	25	19	A
WNØX	71,426	503	71	10	B
KSØM	45,552	312	73	15	B
WØTT	33,000	275	60	6	B
KØRWL (+KØVBU,KMØL)	182,806	1157	79	24	B
WØEEE (NØZSE,KI5LT,KBØSXS, KBØSXW,ops)	36,180	270	67	22	A

Nebraska

AAØW	11,730	115	51	12	Q
KGØKR	48,100	325	74	19	A
KØSW	35,424	246	72	14	A
KØIL	34,056	258	66	15	A
KDØEV	31,330	241	65	12	A
KØNC	27,588	209	66	12	A
KØOAL	20,060	170	59	24	A
WJØZ	18,480	154	60	10	A
KIØHZ	560	20	14	9	A
KBØWHY	160	10	8	8	A

North Dakota

WBØO	226,572	1434	79	24	B
N7IV (+KBØYBX)	82,502	581	71	23	A
AAØVY (+KEØA)	72,988	514	71	19	A

South Dakota

KEØZ	74,480	490	76	23	Q
WØSD (WDØT, op)	234,788	1486	79	24	B

Newfoundland-Labrador

VO1MP	60,350	425	71	15	A
VO1GO	51,380	367	70	20	A

Quebec

VE2ABO	270	15	9	2	Q
VX2AWR	79,350	529	75	22	A
VE2ZP	19,332	179	54	4	B
VE2FFE	7,000	100	35	5	B
VE2ATL	704	22	16	3	B

Ontario

VA3SB	47,012	322	73	24	Q
VA3JEG	1,536	32	24	5	Q
VE3IAY	78,848	512	77	24	A
VA3NR	75,150	501	75	16	A
VE3NTW	43,878	309	71	24	A
VE3WZ	40,880	280	73	13	A
VE3STT	35,478	243	73	18	A
VE3UZ	13,200	120	55	24	A
VE3VHB	12,636	81	78	8	A
VE3EJ	49,770	315	79	6	A
VE3ZTH	37,596	241	78	15	B

Manitoba

VE4XT	71,484	483	74	17	A
VE4VV	170,482	1079	79	23	A

Saskatchewan

VE5SF	141,024	904	78	23	A
VE5CMA	600	20	15	6	A

Alberta

VE6BMX	35,230	271	65	24	Q
VE6GK	25,488	216	59	24	Q
VE6SH	18,012	158	57	10	Q
VE6EX	161,880	1065	76	24	A
VE6KG	118,408	779	76	21	A

British Columbia

VE7CA	50,662	347	73	24	Q
VE7CQK	18,000	150	60	24	Q
VE7CC	179,172	1134	79	24	A
VE7YU	65,912	428	77	20	A
VE7XF	65,758	427	77	20	A
VE7DUG	47,334	343	69	24	A
VE7IN	37,356	283	66	21	A

Yukon

VY1JA	74,160	515	72	24	A

Checklogs

AA3JP, K3SWZ, K7GT, N0ANW, N0XCF, N6NC, PY2NY, W8XS, WA5FRF, WA5TRX, WA8ETY, WB6KOE.

By **Billy Lunt, KR1R**
Contest Manager
and
Bev Fernandez, N1NAV
Assistant Contest Manager

1997 ARRL International EME Competition Results

Can this contest get any better? It's grown from a handful of contacts among a few experimenters to a contest that is drawing in more mainstream hams every year. Folks are finding that EME QSOs are becoming more plentiful and easier to complete than they were about five to 10 years ago. Of course, this is largely due to improved technology, but another leading factor is the growing popularity of EME. With more people in the contest, it is easier to find someone you can work.

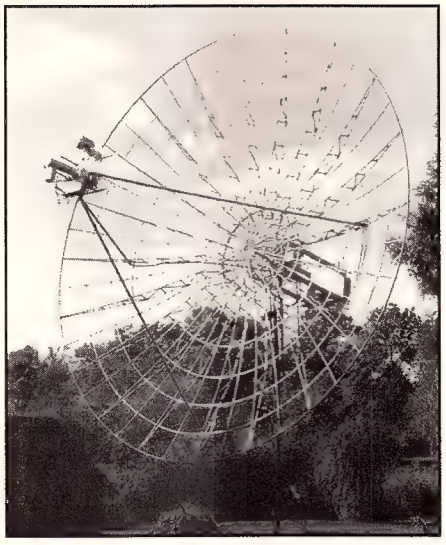
For the 1997 EME Competition, we received 231 entries—an 18% increase from last year. Every year we hear stories about people completing their first EME contacts. Give it a try. You'll probably be surprised at how easy it may be. In this year's contest alone, we had entries from 11 stations that completed only one contact, and 32 stations reported making up to three contacts off the Moon. It doesn't take a lot of equipment or a monster antenna array if you are working one of the "big stations." Let their antennas do all the work.

Pins

EMEers at the 1996 EME Convention in Bowie, Maryland, asked if we could add a pin program to their favorite contest—ARRL International EME Competition. We started working on the forms and procedures and then—voila!—it became a reality for the 1997 contest. To be perfectly honest, we weren't expecting such an impressive response. Pin orders exceeded our most conservative expectations. If you didn't get one of these beautiful EME pins, we still have a few available for those who qualified (completed at least one EME QSO during the contest). Contact ARRL HQ for more information.

Who Won

Perennial winner, Hannes, OE5JFL was blessed with no equipment problems this year and had good weather to boot. Hannes secured the top spot in the single operator multiband category with an impressive 3.1 million points. Mori, KN6M, tried multiband this year, and finished second place world, and first in North America with 1.3 million points. Stig, OZ4MM, was third.



OZ4MM's homebrew 10-meter dish helped him to earn 3rd place in the single-operator multiband category.

In the single operator, single band classes, Torbjorn, SM5FRH, using a massive antenna array, took top honors in the 144 MHz category with 1.7 million points. Dave, W5UN, finished in second place, and first in North America. Dave uses an array of 48 17-element Yagis. Leif, SM5BSZ, was close behind in third place with 1.1 million points. Leif uses a rather modest antenna array consisting of 4 × 14 cross-element Yagis. On 432 MHz, Jan, DL9KR, feeding his antenna array consisting of 16 24-element Yagis, won first place with 575,000 points. Mark, N2IQU, was in second place with 501,000 points. The race for the top spots in the 1296 MHz category was quite tight. Peter, OE9XXI, took first place, completing 72 QSOs and 36 multipliers. Louis, F6CGJ worked 35 multipliers, and contacted 70 stations putting him in second place. Frank, W2UHI, completed 61 QSOs, and 34 multipliers for third place and first in North America.

In the multioperator category, the ops at JL1ZCG topped the list with 2 million points. WD5AGO and crew finished in second place with 422,000 points. F3VS and ops out score the rest of the 2 meter multiops with 1.1 million points. The group at I2FAK was close behind with 1 million points finishing in second place. The crew at OH2PO finished first among a field of five in the multiop 432 MHz category.

John, W7OE, in Washington, didn't need a giant antenna to participate in this year's EME competition. He operated from his Toyota pickup truck in an open field about ½ mile from his house.

I2FAK's impressive antenna array helped his crew attain 2nd place in the multiop, single band 144-MHz category.

Takuhei, JA2TY, is happy that he competed in the EME, and commented," I did it! It wasn't as hard as I thought it was going to be."

Alan, BA1DU, (left) and Chen, BA1HAM, are pictures of concentration as they tune the band looking for EME signals from club station BY1QH.

K2DH and group finished first among a field of five in the multiop 1296 MHz category.

Dates for the 1998 ARRL EME Competition

After listening, sorting, and sifting through all the comments both direct and from the Moon Net, there are a couple of dates that stand out as the best weekends for the 1998 EME contest. We have set the dates for the first weekend as October 10-11, and the second weekend as December 5-6, 1998. Check your calendar and start planning now. Please help us spread the word. We want as many people to participate using their favorite mode (EME, of course!) as possible.

Something New

We received several comments from hams who enjoy operating on the microwave bands. They say that to be competitive in the contest they must operate on the lower bands, or enter the multiband category. They can't afford to spend as much time during the contest on the bands that they prefer (1296 MHz and up) for only a few contacts. Thus they avoid the microwave bands as they strive for a high score.

Since there is a Region 1 scheduling conflict for the best time for the contest in November, we have an open weekend with good conditions. For 1998, we are trying a one-time experiment—a noncompetitive microwave EME weekend, to be held November 7-8, 1998. This will provide a chance to operate on the microwave bands in a contest-like event without jeopardizing your chances to place high in the EME competition standings. Good luck and happy hunting!

Scores

Each line score lists call sign, score, stations worked, multipliers, and band (A= 50 MHz, B = 144 MHz, C = 222 MHz, D = 432 MHz, 9 = 902 MHz, E = 1296 MHz, F = 2304 MHz, I = 10 GHz).

Single Operator, Multiband

OE5JFL	3,135,000	101	40	B
		120	39	D
		64	31	E
KN6M	1,330,000	169	54	B
		21	16	D
OZ4MM	1,296,000	112	36	D
		64	32	E
		4	4	F
SM3AKW	786,500	31	16	B
		59	30	D
		30	18	E
		1	1	F
OE5EYM	756,000	83	32	B
		52	24	D
VE1ZJ	643,800	79	33	B
		11	11	D
		21	14	E
K4QI	567,100	72	30	D
		35	23	E
G3LTF	550,800	55	22	D
		53	29	E
EA3DXU	540,600	66	30	B
		36	23	D
CT1DMK	436,800	33	17	B
		17	14	D
		34	21	E
DF3RU	382,700	66	27	D
		23	16	E
EA3UM	368,000	40	21	D
		40	25	E
F5AQC	367,200	26	21	D
		46	30	E
JA4BLC	354,200	35	16	B
		18	13	D
		22	15	E
		2	2	F
W7HAH	344,000	73	29	B
		13	11	D
VE6TA	335,400	52	22	B
		20	16	D
		6	5	E
PA2CHR	319,800	64	28	B
		18	11	D
S51ZO	257,400	38	20	B
		28	19	D
UT5EC	185,600	14	9	B
		44	23	D
N3WCM	176,400	36	25	B
		13	11	D
F2TU	159,300	4	4	D
		52	20	E
		3	3	F
YO2IS	87,500	11	7	B
		24	18	D
K9BCT	41,800	8	8	E
		14	11	D
KB3PD	39,600	7	6	B
		15	12	D
WB2VVV	16,500	5	4	B
		10	7	D
N0HJZ	5,600	3	2	B
		5	5	D

Single Operator, 50 MHz

K6QXY	100	1	1	A

Single Operator, 144 MHz

SM5FRH	1,724,800	308	56	B
W5UN	1,479,600	274	54	B
SM5BSZ	1,144,800	212	54	B
K7CA	801,600	167	48	B
EA2LU	634,500	141	45	B
I3DLI	576,200	134	43	B
RU1AA	537,100	131	41	B
SM5DCX	524,800	128	41	B
DL5MAE	496,000	124	40	B
IK1MTZ	480,000	120	40	B
AA8BC	380,000	100	38	B
IK1FJI	367,500	105	35	B
W4MW	360,000	100	36	B
W0HP	272,000	85	32	B
WA6PEV	269,700	87	31	B
7K3LGC	234,900	81	29	B
VE3KDH	230,400	72	32	B
K8BHZ	219,000	73	30	B
IK2DDR	207,400	61	34	B
W0AH	205,900	71	29	B
AA7A	204,000	68	30	B
KA5AIH	187,600	67	28	B
LA9NEA	180,000	90	20	B
9A5Y	173,600	62	28	B
OH3AWW	170,100	63	27	B
JH2COZ	168,000	60	28	B
EA6VQ	164,700	61	27	B
S52LM	163,800	63	26	B
DJ7OF	162,000	60	27	B
SM0FFS	153,900	57	27	B
EA5GIY	137,200	49	28	B
K1CA	124,800	52	24	B
PE1LCH	115,000	50	23	B
WA2GSX	110,000	50	22	B
W9HLY	92,000	46	20	B
W0PT	86,400	36	24	B
EA2AGZ	81,900	39	21	B
KA2KQM	79,800	38	21	B
N0AKC	74,100	39	19	B
W0RWH	74,100	39	19	B
DL5DTA	68,400	38	18	B
JH5FOQ	68,400	36	19	B
9A9B	64,800	36	18	B
WA7TDU	57,800	34	17	B
N6PYI	57,600	32	18	B
JK1HIX	56,000	35	16	B
IW1CGB	54,400	32	17	B
WP4G	52,700	31	17	B
I1ANP	49,600	31	16	B
WA6YDI	49,300	29	17	B
GM4JJJ	43,500	29	15	B
N7EIJ	41,600	26	16	B
PE1OGF	41,600	26	16	B
DJ1EJA	36,400	28	13	B
JH0WJF	30,800	22	14	B
DF9CY	30,800	22	14	B
K4VJ	25,200	21	12	B
F6BSJ	22,000	22	10	B
IN3TWX	20,900	19	11	B
K6AAW	16,500	15	11	B
OK1MAC	14,300	13	11	B
7N2TCC	14,000	14	10	B
JH7SIA	12,600	14	9	B
JR6JXV	10,000	10	10	B
SP2JXN	9,800	14	7	B
Z3OB	9,600	12	8	B
JR3REX	7,000	10	7	B
F8DO	6,000	12	5	B
W5UWB	5,600	8	7	B
KE7NS	4,200	7	6	B
N6PI	4,200	7	6	B
K5AM	4,200	7	6	B
I2RV	3,000	10	3	B
WA1JOF	2,400	6	4	B
PE1LWT	2,400	6	4	B
W7OE	2,400	6	4	B
IW4BLG	2,400	6	4	B
F6CRP	2,400	6	4	B
K7MAC	2,000	5	4	B
SP7DCS	1,200	4	3	B
N0KQY	900	3	3	B
W0EKZ	900	3	3	B
W4QS	900	3	3	B
WA8RJF	600	3	2	B
JH0ISW	600	3	2	B
KB9MLA	400	2	2	B
IW5DRA	400	2	2	B
N8ZAT	400	2	2	B
W1VT	200	2	1	B
VE3EQQ	200	2	1	B
N6ZE	200	2	1	B
DK8ZY	200	2	1	B
JH0BBE	100	1	1	B
N5XU	100	1	1	B
IW2MNV	100	1	1	B
K4TAX	100	1	1	B
DF1IAZ	100	1	1	B
IW2LKS	100	1	1	B
W9JN	100	1	1	B

Single Operator, 432 MHz

DL9KR	575,400	137	42	D
N2IQU	501,600	132	38	D
UR5LX	452,400	116	39	D
K1FO	447,700	121	37	D
DL9NDD	388,800	108	36	D
JA5OVU	297,000	90	33	D
N4GJV	272,600	94	29	D
G3SEK	256,000	80	32	D
K0RZ	217,500	75	29	D
W7FN	170,100	63	27	D
ON4KNG	153,400	59	26	D
G4ERG	134,400	48	28	D
EA8FF	127,500	51	25	D
ON5OF	120,000	48	25	D
7M2PDT	108,000	45	24	D
KA0RYT	81,700	43	19	D
W8MQW	78,000	39	20	D
WI7Z	74,100	39	19	D
DK3FB	66,000	33	20	D
I5CTE	60,900	29	21	D
JH4JLV	60,800	32	19	D
DL4KG	58,900	31	19	D
W7CI	53,200	28	19	D
JJ1NNJ	52,200	29	18	D
S52CW	50,400	28	18	D
DL4MEA	49,300	29	17	D
KD4LT	48,600	27	18	D
KL7HFQ	45,900	27	17	D
JR9NWC	43,200	27	16	D
HB9SUL	41,400	23	18	D
I5TDJ	39,100	23	17	D
JA2TY	38,400	24	16	D
DL3EAG	32,300	19	17	D
K5WXN	31,500	21	15	D
IK5WJD	27,000	18	15	D
JO3RNL	20,800	16	13	D
K1OR	16,800	14	12	D
JH1EFA	16,500	15	11	D
HO3A	16,500	15	11	D
KF0M	14,300	13	11	D
9M2BV	8,400	12	7	D
JH0YSI	8,000	10	8	D
JR1RCH	6,300	9	7	D
JJ3JHP	4,900	7	7	D
NA4N	4,900	7	7	D
JI3GER	3,600	6	6	D
ZS6PT	3,000	6	5	D
JJ3JRK	900	3	3	D
JH7PAV	900	3	3	D

Single Operator, 1296 MHz

OE9XXI	259,200	72	36	E
F6CGJ	245,000	70	35	E
W2UHI	207,400	61	34	E
LA8LF	185,600	58	32	E
EA6ADW	168,200	58	29	E
OK1DFC	156,800	49	32	E
HB9BBD	150,000	50	30	E
W4OP	111,800	43	26	E
JH5LUZ	103,400	47	22	E
ON5RR	100,800	42	24	E
N6BQ	92,000	40	23	E
F5PL	91,200	38	24	E
DC6UW	66,500	35	19	E
JA6CZD	32,200	23	14	E
NU7Z	31,500	21	15	E
JH3EAO	26,600	19	14	E
WA4OFS	22,800	19	12	E
NP4B	4,200	7	6	E

Single Operator, 2304 MHz

W4HHK	3,600	6	6	F
ZS6AXT	3,600	6	6	F

Single Operator, 5760 MHz

I6PNN	100	1	1	H
IK2RTI	100	1	1	H

Single Operator, 10 GHz

W6/SM0PYP	1,500	5	3	I
OK1KIR	400	2	2	I

Multioperator, Multiband

JL1ZCG (JO1BMV,JH1DYV,JR4ENY, F7TFK,JE8EVF,ops)

	2,011,400	129	38	B
		63	30	D
		34	21	E

WD5AGO (+WB5BKY,KC5VOY, KD5APG,KD5APH)

	422,400	3	3	B
		42	22	D
		43	23	E

GD4IOM (GD0TEP,GD4GNH,G4XUM, G4UJS,G1GEY,ops)

	35,000	24	13	B
		1	1	D
N2HLT (+N2OLB)	27,000	3	2	B
		15	13	D

Multioperator, 144 MHz

F3VS (FB1PKC,F5JTA,F6EPY, F6HVA,ops)

	1,155,400	218	53	B
I2FAK (+IK2LZT)	1,060,800	204	52	B
I5JUX (IK5QLO,IK5EHR,ops)	614,900	143	43	B
N2WK (+K2DH,K2OS)	151,200	56	27	B
KL7X (+AL7FS)	46,400	29	16	B
KK5IH (W5AL,KK5KK,ops)	12,600	14	9	B
SM2LKW (+SM2ELN)	5,400	9	6	B
VE2JWH (+VE2AAY,VE2PSU,VE2GUQ)	2,800	7	4	B
NX2Q (+N2PBY,N2SWG)	400	2	2	B
BY1QH (BZ1BM,SM0KAK,PA3BZO, PA3DSS,BA1HAM,BA1DU, 7N3OOY,ops)	300	3	1	B
KC8FVO (+KB8DCR)	100	1	1	B

Multioperator, 432 MHz

OH2PO (OH2JTE,OH2PO,OH6DD,ops)	632,100	147	43	D
I2COR (+I2TFI,IK2TLA,IK2PCG,IW2ATM)	156,800	56	28	D
K2OS (+K2DH,N2WK)	36,800	23	16	D
F1CH (+F5IVP,F5SDD)	26,000	26	10	D
W7KK/6 (+K7XC)	10,000	10	10	D

Multioperator, 1296 MHz

K2DH (+K2OS,N2WK)

	255,600	71	36	E
OH2AXH (OH2BNH,OH2BSH, OH2LCT,ops)	168,000	60	28	E
S59DCD (S50X,S54X,S52BT,ops)	137,800	53	26	E
DD0SB (+DL2SBY)	51,000	30	17	E
N4SZ (KB4FEM,KF4UGB,ops)	600	3	2	E

Checklogs

4X1IF, 9H1PA, IW5CNS, K6MYC, K9DTB, N8XA.

Armed Forces Day

Military-To-Amateur Crossband Contacts

Military-to-amateur crossband operations will take place from May 16 at 1300 UTC to May 17 at 1300 UTC 1998. They will include operations in single-sideband voice (SSB) and digital modes (RTTY, PACTOR and AMTOR). Some stations may not operate the entire period, depending on propagation and available personnel. Participating military stations will transmit on selected military frequencies. The military operator will announce the specific Amateur Radio frequency being monitored for replies. Duration of each contact should be limited to three minutes.

Digital Modes Transmitting Test

Digital modes message broadcast will begin at 1640 and 2340 UTC (RTTY, 100 WPM, narrow shift); 1740 and 0040 UTC (PACTOR); and 1740 and 0140 UTC (AMTOR). A 10-minute call for tuning purposes will begin just before each broadcast. The Secretary's message will be transmitted from the following stations on the frequencies shown. (Note: Not all stations may necessarily operate on all the frequencies listed, depending on propagation and equipment.)

AAE, 7358.5, Fort Sam Houston, TX; AAH, 6988.0, 14488.5, Fort Lewis, WA; AIR, 13986.5, Washington, DC; AIR-2, 4490.0, 6996.0, 14405.0, El Segundo CA; MCL, 7375.0, 14480.0, Camp Lejeune, NC; MQU, 7346.5, 14840.0, Quantico, VA; NAV-2, 7365.0, 14471.5, North Charleston, SC; NAV-3, 7393.0, 13975.5, Dallas, TX; NAV-4, 7375.0, 14468.5, Great Lakes, IL; NBL, 7385.0, 14385.0, Groton, CT; NMH, 7372.5, 14443.0, Alexandria, VA; NPL, 7382.5, 14465.0, San Diego, CA; NUW, 7380.0, 13530.0 NAS Whidbey Island, WA; WAR, 13514.0, Fort Detrick, MD

Submission of Test Entries

Transcripts of the RTTY, PACTOR, or AMTOR receiving test should be submitted "as received." No attempt should be made to correct possible transmission errors. Provide time, frequency and call sign of the military station copied, including name, call sign, and address (including ZIP code) of the individual submitting the entry. **Make sure this information is placed on the paper containing the test message.** Each year a large number of acceptable entries are received with insufficient information, or necessary information was attached to the transcriptions and was separated, thereby precluding issuance of a certificate.

Stations copying AAE, AAH, AEMI or WAR send entries to:
Armed Forces Day Celebration
Chief, Army MARS
US Army Signal Command
ATTN: AFSN-TB (MARS)
Fort Huachuca, AZ 85613-5000

Stations copying AIR send entries to:
Armed Forces Day Celebration
789CS/SCOJM, Alabama Ave, SCS-3
Andrews Air Force Base
Washington, DC 20672

Stations copying AIR-2 send entries to:
Armed Forces Day Celebration
SMC/61ABG/DOM (MARS)
2430 E. EL Segundo Blvd Ste Bsmt
El Segundo, CA 90245-4677

Stations copying MCL, MQU, NAV-2, NAV-3, NAV-4, NBL, NHM, NPL, NUW, or NUW send entries to:
Armed Forces Day Celebration
Chief, Navy-Marine Corps MARS
4401 Massachusetts Ave NW
Washington, DC 20394-5460

Table 1—Active Armed Forces Day Military Stations

Station	Military Frequency (kHz)	Mode	Station	Military Frequency (kHz)	Mode	Station	Military Frequency (kHz)	Mode	Station	Military Frequency (kHz)	Mode
AAE	4030.5	LSB		8069.0	LSB		14840.0	RTTY/USB		7385.0	RTTY/USB
	7358.5	LSB		14510.0	USB		20988.5	RTTY/USB		14385.0	RTTY/USB
	13394.5	USB		14663.0	USB	NAV-2	4015.0	RTTY/LSB		20375.0	RTTY/USB
	20941.5	USB	AIR	4025.0	LSB		7346.5	RTTY/USB	NPL	4008.5	RTTY/LSB
	27992.5	USB		6896.0	USB		14471.5	RTTY/USB		7382.5	RTTY/USB
AAH	4021.5	Various		7315.0	LSB		20680.0	RTTY/USB		14465.0	RTTY/USB
	6988.0	Various		20672, 13986.5	RTTY	NAV-3	4472.0	RTTY/USB		20937.5	RTTY/USB
	7312.5	Various		13997.5	USB		7393.0	RTTY/USB	NUW	4826.5	RTTY/LSB
	10151.5	USB		14408.0	USB		13975.5	RTTY/USB		7380.0	RTTY/USB
	4446.5	USB	AIR-2	4490.0	USB		20998.5	RTTY/USB		13530.0	RTTY/USB
	18212.5	USB		6996.0	USB	NAV-4	4033.5	RTTY/LSB		19956.5	RTTY/USB
	20975.0	USB		6776.0	Packet		7372.5	RTTY/USB	WAR	4018.5	LSB
AAZ	4036.5	LSB		14405.0	USB		14468.5	RTTY/USB		6997.5	USB
	6908.0	USB	MCL	4515.0	RTTY/LSB		27810.0	RTTY/USB		7361.5	Various
	7422.5	LSB		7375.0	RTTY/USB	NBL	4040.0	RTTY/LSB		13514.0	RTTY
	13965.0	USB		14480.0	RTTY/USB		7365.0	RTTY/USB		14930.5	USB
	21825.5	USB		24783.0	RTTY/USB		14393.0	RTTY/USB		20995.5	USB
	27790.0	USB	MQU	4005.0	RTTY/LSB		20625.0	RTTY/USB			
AEMI	4441.5	LSB		7346.5	RTTY/USB	NMH	4011.0	RTTY/LSB			

New Products

2-METER INTERMOD FILTERS FROM MFJ

◊ Designed to eliminate intermodulation interference in the 2-meter ham band—the annoying squeaks, squawks, bleeps and tones caused by the inadvertent mixing of high-power TV, paging and FM broadcast signals—MFJ's Model 713/714 intermod filters attenuate out-of-band signals up to 50 dB.

Both filters, which install between your rig and antenna, have high-Q bandpass filters (two L-sections); surface-mount components; RF-tight aluminum enclosures, and on/off switches with indicator LEDs. The filters reduce or eliminate interference while receiving and are automatically bypassed during transmit.

The MFJ-713, for hand-helds, has BNC antenna/RF connectors and is powered by an internal 9-V battery. The MFJ-914, for mobile rigs, has SO-239 connectors and is powered by 12-V dc.

Price: $179.95. Both are covered by MFJ's "no matter what" one-year unconditional warranty. If the *IntermodFighters* aren't available at your favorite ham radio dealer, contact MFJ at PO Box 494, Mississippi State, MS 39762; tel 800-647-1800; fax 601-323-6551; **http://www.mfjenterprises. com**. QST

Strays

VINTAGE FIELD DAY

◊ The second annual *Electric Radio*-sponsored "Vintage Field Day" will occur June 13 and 14, 1998. For complete Vintage Field Day rules and information send a self-addressed, stamped envelope to *Electric Radio* at 14643 County Rd G, Cortez, CO 81321-9575, or e-mail **er@frontier.net**.

1998 ARRL Field Day Rules

By **Billy Lunt, KR1R**
Contest Manager

1. Eligibility: Field Day is opened competitively to all amateurs in the ARRL/RAC Field Organization (plus Yukon and Northwest Territories). Foreign stations may be contacted for credit, but are not eligible to compete.

2. Object: To work as many stations as possible on any or all amateur bands (excluding the 30, 17, and 12-meter bands) and, in doing so, to learn to operate in abnormal situations under less-than-optimum conditions. A premium is placed on skills and equipment developed to meet the challenge of emergency preparedness and to acquaint the public with the capabilities of Amateur Radio.

3. Date and Field Day Period: Always held on the fourth full weekend of June. Begins 1800 UTC Saturday, ends 2100 UTC Sunday (June 27-28, 1998).

3.1. Class A and Class B (see below) stations who do not begin setting up until 1800 UTC Saturday may operate the entire Field Day period of 27 hours.

3.2. Others must begin their setup no earlier that 1800 UTC Friday, and may operate no more than 24 consecutive hours, ie, once on-the-air Field Day operation has started, it must end 24 hours from that point.

4. Entry Categories: Field Day entries are classified according to the maximum number of simultaneous transmitted signals, followed by the designation of the nature of the individual or group participation. Below 30 MHz, once a transmitter is used for a contact on a band, it must remain on that band for at least 15 minutes. During this 15-minute period, the transmitter is considered to be transmitting a signal, whether it is or not, for the purpose of determining transmitter class. Switching devices are prohibited.

4.1. (**Class A**) Club/nonclub portable: Club groups (or nonclub groups with three or more licensed amateurs) set up specifically for Field Day. Such stations must be located in places that are not regular station locations, and must use no facilities installed for permanent station use, nor any structures installed permanently for Field Day use. Stations must be operated under one call sign (except when the Novice/Technician Plus position is used) and under the control of a single licensee or trustee for each entry. All equipment (including antennas) must lie within a circle whose diameter does not exceed 300 meters (1000 feet). All contacts must be made with transmitter(s) and receiver(s) operating independent of commercial mains. Entrants who, for one reason or another, operate a transmitter or receiver from commercial mains for one or more contacts will be listed separately at the end of their class.

4.1.1. Any Class A group whose entry classification is two or more transmitters (non-Novice) may also use one Novice/Technician Plus operating position (Novice bands only) without changing its basic entry classification. For Field Day purposes only, any Canadian Amateur HF licensee, who has been licensed for less than six months prior to Field Day, shall be considered a "Novice" to provide a means for Canadian Field Day Class A stations with two or more transmitters to participate with a "Novice/Technician Plus" operating position. This "Canadian Novice station" is restricted to the US Novice sub-bands and power/mode restrictions. The Novice/Technician Plus station (including antennas) should be set up and operated by Novice and Technician Plus licensees and should use the call sign of one of the Novice/Technician Plus operators.

4.1.2. Any Class A group whose entry classification is two or more transmitters may also use one station that operates exclusively on any band or combination of bands above 50 MHz (VHF/UHF bands) without changing its basic entry classification. This station may be operated for the entire Field Day period, and all contacts count for QSO points credit.

4.2. (**Class A—Battery**) Club/nonclub portable: Club groups (or nonclub groups with three or more licensed amateurs) set up specifically for Field Day and all contacts are made using an output power of 5 W or less and the power source is other than commercial mains or motor-driven generator (eg, batteries, solar cells, water-driven generators). Other provisions are the same as for Class A.

4.3. (**Class B**) One or two-person portable: Nonclub stations set up and operated by not more than two licensed amateurs will be placed in Class B. Other provisions are the same as for Class A. One and two-person Class B entries will be listed separately in the results.

4.4. (**Class B—Battery**) One or two-person portable: Nonclub stations set up and operated by not more than two licensed amateurs and all contacts are made using an output power of 5 W or less and the power source is other than commercial mains or motor-driven generator (eg, batteries, solar cells, water-driven generators). Other provisions are the same as for Class A. One and two-person Class B—Battery entries will be listed separately in the results.

4.5. (**Class C—Mobile**) Stations in vehicles capable of operating while in motion and normally operated in this manner, including antenna. This includes marine and aeronautical mobiles.

4.6. (**Class D**) Home stations: Stations operating from permanent or licensed station locations using commercial power. Class D stations may count contacts only with Class A, B, C and E Field Day groups for points.

4.7. (**Class E**) Home stations—emergency power: Same as Class D, but using emergency power for transmitters and receivers. Work stations in Class A, B, C, D and E.

5. Exchange: Stations in any ARRL/RAC Section will exchange their Field Day operating class and ARRL/RAC Section. For example, if your club group was planning to operate in the three-transmitter, Class A category from Missouri, you would send "3 A Missouri." Foreign stations send RS(T) and QTH.

6. Miscellaneous Rules:

6.1. Operators participating in Field Day may not, from any other station, contact for point credit the Field Day portable station of a group with which they participated.

6.2. A station used to contact one or more Field Day stations may not subsequently be used under any other call during the Field Day period. Family stations are exempted.

6.3. Each phone, each CW, and each digital (non-CW) segment is considered as a separate band. (A station may be worked once on each band.)

6.4. All voice communication contacts are equivalent.

6.5. Crossband contacts are not allowed.

6.6. The use of more than one transmitter at the same time on a single band is prohibited, except that a Novice/Technician Plus position may operate on any Novice band segment at any time.

No repeater contacts.

6.7. Batteries may be charged while in use for Class C entries only. For other classes, batteries charged during the Field Day period must be charged from a power source independent of the commercial mains.

7. Scoring: Scores are based on the total number of valid contact points times the multiplier corresponding to the highest power

Major Changes for 1998!

The Field Day Rules have changed dramatically. Be sure to read them over completely. There are no longer bonus points for packet or VHF/UHF. You may no longer use digipeaters, nodes, and so on for packet radio contacts. We have added a digital mode category (nonCW) for each band. Each phone, each CW, and each digital (nonCW) segment is considered as a separate band. (A station may be worked once on each band.)

Send for Your Field Day Package

Send to HQ a 9 x 12-inch self-addressed envelope with four units of First Class US postage or four IRCs for the official Field Day Entry Package. This package includes one Publicity Kit, one Field Day Summary Sheet, one large dupe sheet with instructions and a check list to ensure that your entry is complete. If you require more dupe sheets, indicate this in your request and affix one unit of additional First Class postage to your SASE for each two additional dupe sheets required.

How to Get Entry Forms

Official entry forms for the 1998 Field Day are available electronically from several sources:

- From the ARRL Internet InfoServer. Send an e-mail message to **info@arrl.org**. The subject line is ignored. Enter the following text in the body of your message:

HELP
SEND FD.FRM
SEND FD.RLS
SEND MEDIA.TXT
QUIT

- From the ARRL BBS (860-594-0306), in File Area 2 (contests).
- From the ARRL's World Wide Web home page, at **http://www.arrl.org/contests/forms**.

Complete rules and entry forms for all the ARRL-sponsored contests are included in the *ARRL Contest Yearbook*, which is available for $5 from Publication Sales at ARRL HQ (order number 6680).

used at any time during the Field Day period, plus bonus points.

7.1. Phone contacts count one point each.

7.2. CW and digital contacts count two points each.

7.3. Power multipliers:

7.3.1. If all contacts are made using an output power of 5 W or less **and if a power source other than commercial mains or motor-driven generator is used (eg, batteries, solar cells, water-driven generators), multiply by 5.**

7.3.2. If any or all contacts are made using an output power of 150 W or less, multiply by 2.

7.3.3. If any or all contacts are made using an output power more than 150 W, multiply by 1.

7.4. **Bonus points:** The following bonus points will be added to the score (after the multiplier is applied) to determine the final score. Only Class A and B stations are eligible for bonuses. Just check the box on the Field Day summary sheet to indicate that you qualify for the bonus, and attach the necessary proof.

7.4.1. **100% emergency power:** 100 points per transmitter for 100% emergency power. All equipment and facilities at the Field Day site must be operated from a source independent of the commercial mains. Example: A club operating 3A, using 100% emergency power may claim 300 bonus points.

7.4.2. **Public relations:**

7.4.2.1. 100 points for media publicity. Publicity must be obtained or a bona fide attempt to obtain publicity must be made. Evidence must be submitted in the form of a newspaper clipping, a memo from a BC/TV station stating that publicity was given or a copy of the material that was sent to the news media for publicity purposes.

7.4.2.2. 100 points for physically locating in a public place (eg shopping center, parks, etc) with significant access by the public. The intent here is for Amateur Radio to be on display to the public.

7.4.2.3. An additional 100 points can be earned by such display stations in public places actively conducting an information booth for the visiting public, and dispensing information handouts, maintaining visitor's log, etc, as an information/recruiting tool for Amateur Radio. Evidence submitted for both (B) and (C) may consist of copies of handouts, visitor's log, brief report on activities conducted, photos, etc.

7.4.3. **Message origination:** 100 points for origination of a message by the club president or other Field Day leader, addressed to the SM or SEC, stating the club name (or nonclub group), number of operators, field location and number of ARES members participating. The message must be transmitted during the Field Day period, and a fully serviced copy of it must be in standard ARRL message form or no credit will be given.

7.4.4. **Message relay:** 10 points for each message received and relayed during the Field Day period, up to a maximum of 100 points. Copies of each message, properly serviced, must be included with the Field Day report.

7.4.5. **Satellite QSO:** 100 points can be earned by completing at least one QSO via satellite during the Field Day period. The repeater provision of Rule 6.6 is waived for satellite QSOs. A satellite station (one) does not count as an additional transmitter. On the summary sheet, show satellite QSOs as a separate "band."

7.4.6. **Natural Power:** Field Day groups making a minimum of five QSOs without using power from commercial mains or petroleum derivatives can earn 100 points. Intuitively, this means an "alternate" energy source of power such as solar, wind, methane or grain alcohol. This includes batteries charged by natural means (not dry cells). The natural-power station counts as an additional transmitter. If you do not wish to change your entry class, take one of your other transmitters off the air while making the natural-power QSOs. A separate list of natural-power QSOs should be enclosed with your entry.

7.4.7. **W1AW message:** A bonus of 100 points will be earned by copying a special ARRL Field Day bulletin sent over W1AW on its regularly announced frequencies just before and during Field Day. This message can be received directly from W1AW or by any relay method. An accurate copy of the received message should be included in your Field Day report.

8. **Reporting:** Entries must be postmarked by July 28, 1998. No late entries can be accepted. A complete entry consists of an official ARRL summary sheet (or reasonable facsimile) and a list of stations worked on each band/mode during Field Day, plus bonus proof. The list of stations worked on each band or mode may take the form of official ARRL dupe sheets or an alphanumeric listing of call signs worked per band and mode. This list may be computer-generated. Incomplete or illegible entries will be classified as checklogs. A copy of Field Day logs should be kept by your Field Day group, but should not be sent in unless specifically requested later by the ARRL.

9. Other: See General rules for All ARRL Contests, Dec 97 QST, pp 100-104. QST

W1AW Field Day Bulletin Schedule

	Mode	Pacific	Mountain	Central	Eastern
FRIDAY	CW	5:00 PM	6:00 PM	7:00 PM	8:00 PM
	Teleprinter	6:00 PM	7:00 PM	8:00 PM	9:00 PM
	Phone	6:45 PM	7:45 PM	8:45 PM	9:45 PM
	CW	8:00 PM	9:00 PM	10:00 PM	11:00 PM
	Teleprinter	9:00 PM	10:00 PM	11:00 PM	12:00 PM
	Phone	9:45 PM	10:45 PM	11:45 PM	12:45 AM
SATURDAY	CW	7:00 AM	8:00 AM	9:00 AM	10:00 AM
	Phone	8:00 AM	9:00 AM	10:00 AM	11:00 AM
	CW	5:00 PM	6:00 PM	7:00 PM	8:00 PM
	Teleprinter	6:00 PM	7:00 PM	8:00 PM	9:00 PM
	Phone	6:45 PM	7:45 PM	8:45 PM	9:45 PM
	CW	8:00 PM	9:00 PM	10:00 PM	11:00 PM
	Teleprinter	9:00 PM	10:00 PM	11:00 PM	12:00 PM
	Phone	9:45 PM	10:45 PM	11:45 PM	12:45 AM
SUNDAY	CW	7:00 AM	8:00 AM	9:00 AM	10:00 AM
	Phone	8:00 AM	9:00 AM	10:00 AM	11:00 AM

Strays

UPGRADE YOUR *ANTENNA BOOK* SOFTWARE

The *YT* and *TLA* programs included in the first printing of the 18th edition of the *ARRL Antenna Book* have been significantly upgraded in the second printing. You can update your first-printing software directly from the Web by going to **http://www.arrl.org/notes/antbook**. There you'll find a software patch and instructions. The instructions tell you how to patch the original files to upgrade them up to the level of the software included with the second printing.

Assuming that the default subdirectories were used for the original installation, the following files are upgraded:

\ANTBOOK\TERRAIN*YT.EXE*
\ANTBOOK\TERRAIN*YT.TXT*
\ANTBOOK\XMSNLINE*TLA.EXE*
\ANTBOOK\XMSNLINE*TLA.TXT*

Just copy the *PATCHYT.EXE* file into the \ANTBOOK\TERRAIN subdirectory (or whichever subdirectory you first installed the terrain files). Then type **PATCHYT [Enter]**. The program will search for valid copies of the *YT.EXE* and *YT.TXT* files in that subdirectory, and then will update them to the latest level.

The procedure for the *TLA* upgrades is similar. Copy the *PATCHTLA.EXE* file into the \ANTBOOK\XMSNLINE subdirectory and type **PATCHTLA [Enter].**

If either patch fails, reinstall the software from the original diskette supplied with the 18th edition of the *ARRL Antenna Book*, and rerun the patching program. Please read the new documentation files *YT.TXT* and *TLA.TXT* for each program to learn about the new features. If you have any questions or problems, contact Dean Straw, N6BV, at **n6bv@arrl.org**.

ARRL June VHF QSO Party Rules

By **Billy Lunt, KR1R**
Contest Manager

1. Object: To work as many amateur stations in as many different 2° × 1° grid squares as possible using authorized frequencies above 50 MHz. Foreign stations work W/VE amateurs only.

2. Date and Contest Period: The second full weekend of June. Begins 1800 UTC Saturday, ends 0300 UTC Monday (June 13-15, 1998).

3. Entry Categories:

3.1. Single Operator.

3.2. Single Operator, QRP Portable.

3.3. Rover.

3.4. Multioperator.

3.5. Limited Multioperator.

4. Exchange: Grid-square locator (see April 1994 *QST*, p 86).

4.1. Exchange of signal report is optional.

5. Scoring:

5.1. QSO points:

5.1.1. Count one point for each complete 50 or 144-MHz QSO.

5.1.2. Count two points for each 222 or 432-MHz QSO.

5.1.3. Count three points for each 902 or 1296-MHz QSO.

5.1.4. Count four points for each 2.3-GHz-or-higher QSO.

5.2. Multiplier: The total number of different grid squares worked per band. Each 2° × 1° grid square counts as one multiplier on each band it is worked.

5.3. Final score: Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score.

5.4. Rovers only: The final score consists of the total number of QSO points from all bands times the sum of unique multipliers (grid squares) worked per band (regardless of which grid square they were made in) plus one additional multiplier for every grid square activated (made a contact from).

5.4.1. Rovers are listed in the contest score listings under the division from which the most QSOs were made.

6. Miscellaneous:

6.1. Stations may be worked for credit only once per band from any given grid square, regardless of mode. This does not prohibit working a station from more than one grid square with the same call sign (such as a Rover).

6.2. Only one signal per band (6, 2, 1¼, etc) at any given time is permitted, regardless of mode.

6.3. Multioperator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHz. Even then, a complete, different station (transmitter, receiver and antenna) must exist for each QSO made under these conditions.

7. Awards:

7.1. Plaques (if sponsored) will be awarded in the following categories:

7.1.1. Top 10 single operator scorers

7.1.2. Top five single operator QRP portable scorers

7.1.3. Top five rover scorers

7.1.4. Top 10 multioperator scorers

7.1.5. Top five limited-multioperator scorers

7.2. Certificates will be awarded in the following categories.

7.2.1. Top single operator in each ARRL/RAC Section.

7.2.2. Top single operator on each band (50, 144, 222, 432, 902, 1296 and 2304-and-up categories) in each ARRL/RAC Section where significant effort or competition is evident. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band endorsements.) For example, if WBØTEM has the highest single-operator all-band score in the Iowa Section and his 50 and 222-MHz scores are higher than any other Iowa single operator's, he will earn a certificate for being the single-operator section leader and endorsements for 50 and 222 MHz.

7.2.3. Top single-operator, QRP portable in each ARRL/RAC Section where significant effort or competition is evident. (Single-operator, QRP portable entries are not eligible for single-band awards.)

7.2.4. Top rover in each ARRL Division and Canada where significant effort or competition is evident. (Rover entries are not eligible for single-band awards.)

7.2.5. Top multioperator score in each ARRL/RAC Section where significant effort or competition is evident. (Multioperator entries are not eligible for single-band awards.)

7.2.6. Top limited multioperator in each ARRL/RAC Section where significant effort or competition is evident. (Limited multioperator entries are not eligible for single-band awards.)

8. See "General Rules for All ARRL Contests", December 1997 *QST*, p 100. QST

Scoring Example

Band (MHz)	QSOs	QSO Points	Grid Squares
50	25 (x1)	25	10
144	40 (x1)	40	20
222	10 (x2)	20	5
432	15 (x2)	30	10
1296	6 (x3)	18	3
Totals	96	133	48

Final score = (QSO points) x (total no. grid squares): **6384** (133 x 48).

How to Get Entry Forms

Official entry forms for the 1998 June VHF QSO Party are available electronically from several sources:

- From the ARRL Internet InfoServer. Send e-mail message to **info@arrl.org**. The subject line is ignored. Enter the following text in the body of your message:

HELP
SEND VHFQSO.FRM
QUIT

- From the ARRL BBS (860-594-0306), in File Area 2 (contests).
- From the ARRL's World Wide Web home page, at **http://www.arrl.org/contests/forms**.

Complete rules and entry forms for all the ARRL-sponsored contests are included in the *ARRL Contest Yearbook*, which is available for $5 from Publication Sales at ARRL HQ (order number 6680).

Strays

DO YOU HAVE MY RADIO?

◊ In 1968 I built a HeathKit SB-101 transceiver. I was 15 years old and it was my primary station. A wife, three kids, an apartment and two houses later, I sold it in order to buy a sewing machine for my wife. That was in 1984 and I lived in Burnsville, Minnesota. I now live in Kansas City, Missouri, and I'd love to find that rig!

I know it's probably a hopeless case because I have no idea who I sold it to, but I'm betting that someone still has the radio in their possession. The only distinguishing marks on the rig when I sold it were on the speaker/power supply enclosure where I had glued "KK" in three-inch silver letters. If you think you have my old SB-101, please contact me: Keith Kaiser, WAØTJT, 6005 NW 70th St, No. 205, Kansas City, MO 64151; tel 816-587-9636; e-mail **kkaiser@sound.net**.

I would like to get in touch with...

◊ hams who have experience in radio astronomy, particularly with observations of emissions from Jupiter between 18 and 20 MHz. Please contact André Pettelat, F9AP, 29 rue Saint-Maur, F-75011 Paris, France; e-mail **f9ap@wanadoo.fr**.

◊ hams who are Civil War re-enactors. We are looking for CW operators who are interested in participating in the 135th anniversary re-enactment of the Battle of Gettysburg, to be held over the July 4th weekend in Gettysburg, Pennsylvania. We will have Civil War-era telegraph stations on site using both International and American Morse code. E-mail **w.mathers@juno.com**. (Walter F. Mathers, Chief Signal Officer and Captain, Army of Northern Virginia.)

◊ hams who are also college students. My name is Rong Xinhua and I am a student at the University of Science and Technology of China. I hope to have my Amateur Radio license soon. You can contact me at PO Box 4, 5-212, Hefei, Anhui, 230027, China, or by e-mail at **lib@pub.sz.jsinfo.net**.

◊ anyone willing to donate the components of a 486 PC (processor and hard drive in particular) to the Yalta Club Amateur Radio station UU4JWF. We are attempting to assemble a computer so that we can operate packet, RTTY and the other digital modes, but it is impossible to find these components in the Ukraine. Contact Boris Chuistov, UU5JK, PO Box 20, Yalta, Crimea, 334200 Ukraine.

Edited by **Steve Ewald, WV1X** • Assistant Field Services Manager

The ARRL Field Organization Forum

Field Organization Abbreviations

ACC	Affiliated Club Coordinator
ARES	Amateur Radio Emergency Service
ASM	Assistant Section Manager
BM	Bulletin Manager
BPL	Brass Pounders League
DEC	District Emergency Coordinator
DXFR	DX Field Representative
EC	Emergency Coordinator
LGL	Local Government Liaison
NCS	Net Control Station
NM	Net Manager
NTS	National Traffic System
OBS	Official Bulletin Station
OES	Official Emergency Station
ORS	Official Relay Station
OO	Official Observer
OOC	Official Observer Coordinator
PBBS	Packet Bulletin Board Station
PIC	Public Information Coordinator
PIO	Public Information Officer
PSHR	Public Service Honor Roll
SGL	State Government Liaison
SEC	Section Emergency Coordinator
SM	Section Manager
STM	Section Traffic Manager
TCC	Transcontinental Corps
TA	Technical Advisor
TC	Technical Coordinator
TS	Technical Specialist
VC	Volunteer Counsel
VCE	Volunteer Consulting Engineer
VE	Volunteer Examiner

ATLANTIC DIVISION

DELAWARE: SM, Randall Carlson, WB0JJX—Amateur Radio participated in the State REP plan exercise on March 3. Thanks to all those that helped out. Spring is upon us and as usual a lot of charity walks and fund raisers are making use of Amateur Radio. Assisting in these events does a lot to bring the hobby to the public and present it in a very positive light. At the same time, it allows us to sharpen up our skills in working with groups outside of Amateur Radio. So if there is an event being scheduled in your area that Amateur Radio is assisting with, consider taking the time to help out. Well it's coming up on June, and Field Day is just around the corner. It's not too early to start planning for this year's outing. I hope your clubs consider participating in the event, even if only for a few hours. It is my firm belief that the score is not the important point, but the taking part. So if you club cannot field a station for the entire time, consider it for just a few hours. Delaware traffic Nets: DTN meets on M-F 1830 local time on 3905 kHz M-F and DEPN meets on Sat 1800 local time on 3905 kHz..73, Randall.

EASTERN PENNSYLVANIA: SM, Allen R. Breiner, W3TI—SEC: WB3FPL. STM: W3KOD. OOC: W3DZI. BM: WA3PZO. TC: K3DS. PIC: WB3DCL. ASMs: WY3K, K3TX, W3ZXV, N3KYZ. Sixty-five League affiliated clubs in 34 counties is entirely too much area for one Affiliated Club Coordinator to cover and perform the prescribed duties. As Section Manager, I designed a new system whereby a number of Assistant Affiliated Club Coordinators will be appointed to oversee a few of the clubs in their immediate area. Hence, giving the League and the section a closer contact with each club. The Phil-Mont Mobile RC repeater on 147.030 MHz had to vacate their long time standing repeater site and found a new home for it on an existing tower near Ridge and Port Royal Avenue. The Holmesburg ARC repeater on 146.685 MHz added a new input in the Abington area, their main repeater is located at the University of Pennsylvania. Congratulations go to N3LJZ and N3MJM on the arrival of Owen, their third harmonic. The Mid-Atlantic ARC's VE team were a party to up-grades KB3BUO Tech Plus and N3VXB to General. The Tamaqua Wireless Assn VE team added the following New license; one Tech, 3 Tech Plus, and one General, WA3WIJ, KB3BWH, and N3WYB made it to the "BIG X." The Penn Wireless Association presented the "Penmanship Award 1997" to KE3QB for all around best articles printed in *X-MITTER*, their club bulletin. Does your club honor its members with special awards? Let us hear about them. A 911 call "bomb threat" to the Chester county com-center was just cause for immediate evacuation of the area. Those ARES/RACES members activated were N3QFH, K3JV, KE3MN, KD3OK, N3LRA, WA3JYU, N3NUK, N3YGW. Living in mountainous terrain amidst all the hill and trees of the forest we said it could never happen in Schuylkill county, and then it happened. Tamaqua area experienced its first Tornado. Tamaqua amateurs learned their lesson during the flood of 1955 and their ARES/RACES team was ready to respond when the word went out "Tornado." No lives were lost, but property damage was estimated to be over one and a half million dollars. The experience and horror stories are just now beginning to filter down from ice and snow damaged Northern New York and Canada. Once again Amateur Radio came to the rescue. Is your Emergency team ready if it should happen in your backyard? Field Day is only one month away and an excellent way to get that experience when the TV and the light switch on the wall don't work and no sounds come from the telephone. Are you ready? The New Emergency Coordinator for Philadelphia county is KB3AAJ. Out of the 34 counties in our section the following have no emergency coordinator or known emergency response team in case it does happen. Northumberland, Cumberland, Lackawanna, Delaware, Bradford, Juniata, Wayne, Perry, Adams and Tioga. EC appointments are open for volunteers. If interested ask us for an application. The Pennsylvania Phone Net, which operates Monday thru Friday at 5:30 PM, has moved to its new frequency on 3895 kHz. Traffic for Feb: W3KOD 459, N3DRM 400, W3IVS 247, N3EFW 199, NR3K 148, N3HR 66, W3IPX 59, N3AT 52, AD3X 52, N3NNH 49, WA3EHD 37, WY3K 27, W3JKX 23, N3AO 22, W3NNL 18, K3TX 18, W3BNR 15, KA3FTG 11, KA3LVP 11, W3TI 10, N3YSI 10, N3AS 9, W3TWV 9, N3DCG 7, W3KAG 7, K3ARR 6, N3KYZ 6, WA3CKA 5, N3IRN 4, WB3GCK 3, W3DP 2, KA3KMH 2, WB3JOE 2. Net reports; EPA 233 PFN 126, EPAEP&T 107, PTTN 31, MARCTN 28, LCARES 14, D6ARES 5, CCRAN 4, EPAS 4, SCESN 4, D8ARES 2 SEPTN 2.

MARYLAND/DC: SM, Bill Howard, WB3V (wb3v@erols.com)—ACC: Tony Young, WA3YLO 301-262-1917. ASM: Jerry Gavin, NU3D 410-761-1423 (k2ilq@aol.com). ASM/RACES Coord: Al Nollmeyer W3YVQ (alyvq@juno.com). BM: Al Brown, KZ3AB 301-490-3188 (Al_Brown@ix.netcom.com). SEC: Mike Carr, WA1QAA (bamcc@erols.com) 410-799-0403. STM: Bruce Fleming 301-863-6582 (MEGASWOOP@aol.com). TC: Bob Bruninga WB4APR 410-553-6021 (bruninga@greatlakes.nadn.navy.mil) MDC Section Web home-page www.erols.com/wb3v/mdc/. Please visit the MDC home page for all the latest links, information and more nets! STMA EC N3RVX reports 24 members; 3 nets on 146.64 with a total check in of 15. The STMA ARES net maintains liaison with MEPN and packet. BJ reports the first PSE was held on February 28 in conjunction with the ARC Mock Shelter exercise. Three ARES members participated: KE3OX, KB3AMO, and N3RVX. 18 messages were sent and 2 messages received during the operation. GARR EC N3KAT reports 9 ARES members, and 4 nets on 147.015. The next GARR ARES group ham class is planned for the end of September with testing on December 12 or 19. CECI EC N3AJJ reports 18 ARES members, two meetings with RACES Radio Officer K3UAV, and one meeting with EMA/EOC officials. Bill reports that CECI has a new EM director and he has explained the ARES function, and process to the new director. Bill is now the assistant RACES officer in CECI and regularly attends the meetings on disaster planning. HOWA RACES/ARES was contacted by HOWA EM officials on February 7 advising of a telephone switch outage in the Columbia area and asked to come to stand-by status. HOWA RO activated the RACES/ARES call up tree to notify members of the situation and convened on the CARA 147.135 repeater for response coordination. The switch controls eight central office numbers, seven in the 410 area code and one in the 301 area code, and its malfunction left some 54,000 people without phone service. ARES/RACES response was tremendous. The Laurel Beltsville hospital is now equipped with Amateur Radio equipment. This site is a regular participant in the monthly COMEX. Pud, W3YD, has invited Kay to conduct the March COMEX from the hospital, and has invited other hospital officials and dignitaries from the Laurel Women's Club to attend. With the nets: NET/NET MGR/QND/QTC/QNI: MSN/KC3Y/28/50/274, MEPN/KE3OX/28/99/588, MDD/WJ3K/No Report/, MDD Top Brass/No Report, BTN/AA3LN/No Report/, SMN/KE3OX/3/4/15, JANUARY BTN/AA3LN/31/421/59, Tfc: KK3F 500, KB3AMO 130, N3DE 98, W3YVQ 94, K3GHH 83, KE3OX 70, WA3YLO 59, KC3Y 52, K3USO 48, N3WKE 48, N3RVX 40, N3WK 27, N3ZPK 17, N3EGF 16, WA1QAA 14, KG6TU 10, KJ3E 8, WA3GYW 3, WA3WRT 2, KE3FL 1. PSHR: KK3F 174, W3YVQ 148, N3RVX 123, WA3YLO 117, KB3AMO 114, KG6TU 111, K3GHH 104, N3WKE 101, KC3Y 100, KE3OX 99, WA1QAA 84, WA3WRT 84, KJ3E 80, KE3FL 80.

NORTHERN NEW YORK: SM, Les Schmarder, WA2AEA—ASMs: WB2KLD, N2ZMS, WA2RLW ACC: WZ2T. BM: KA2JXI. OOC: N2MXR. PICs: N2SZK, WA2RXO. SEC/SGL: WN2F. STM: N2ZGN. TC: N2JKG. Club Officers: OVARC- WA2NAN, N2EBG, KB2HPR. MVARC- W2TDD, WA2AEA. DOERS- KD2AJ, N2JKG, N2IXL, WA2AEA. Seems to be renewed interest in ARES/RACES in NNY since the ice, notably in St Lawrence Co. with OARC and OVARC officers involved. DEC Tom, KF2GC, has been active with students after school in Saranac Lake with CW practice and ARRL videos. Winter fests and swap meets are giving way to the outdoor version. Don't forget Rochester NY Hamfest & Atlantic Division Conference starting May 29. The Friday afternoon affiliated club meeting was very interesting last year. CVARC hamfest is the following weekend at Clinton County Fairgrounds, with VE session at noon; contact WA2AEA. Tupper Lake VE session May 9; contact W2AFN. Feb rpts- BBS (B/P/T): KA2JXI 1838/630/33, KD2AJ 2846/757/77. Nets (QNI/QTC/QND): BILL'S GERITOL 248/0/20, CARRIER 590/51/24, CVARCCPN 53/0/8, CVARCSN 35/0/4, JCRAC 376/17/28, MVARC 17/0/3, NDN 243/1/28, OVARC 56/2/4, Q NET 452/3/28, SIRR 779/30/28, W2UXC SWAP 18/0/3. 73, Les, WA2AEA.

SOUTHERN NEW JERSEY: SM, Jean Priestley, KA2YKN (@K2AA) e-mail: ka2ykn@mosquito.com—ASM: W2BE, K2WB, W2OB, N2OO. SEC: W2HOB. STM: WB2UVB. ACC: KB2ADL. TC: W2EKB. SGL: KB2WKY. BM: KB2GNB. OOC: K2PSC. PIC/PIO: N2YAJ. TS: W2PAU, W2BE, AB2Y, K2JF, WB2MNF, KD4HZW. An amateur is considerate, loyal, progressive, friendly, balanced and patriotic. It's easy to forget these words. When this happens, we need to remind our fellow hams about the Amateur Code. Jim Eckersley, K2IXE, licensed 1932, has given years of service to ham radio in New Jersey. Jim served as ACC and editor for *Old Barney* newsletter. We salute Jim's dedication to life, family, and Amateur Radio. A simple request but last year a bill to put "Amateur Radio" on our license plates died Dec 31, 1997. A new bill has been introduced. This time we fight. Write your politicians and ask for their support on bill A225. Send QSL cards AND letters. You don't need to live in New Jersey to support this bill. Perhaps by the time this goes to print, the bill will have passed. SJVN traffic net nightly 10:30 PM. STM: WB2UVB 149, W2HOB-4 142, K2UL 98, WA2CUW 75,WA2Z 75, KB2RTZ 55, AA2SV 45, N2WFN 44 KB2VSO 28,KA2CQX 24, K2UL-4 18, N2FHJ 18, WA2JSG 17, KD4FQG 16, N2ZMI 10, KB2YJD 10, N2FET 8, N2AYK 8, N2MSM 7, KE2EH W2HOB 6, KB2YBM 2, KB2VSR N2FHK N2SOE KC2CLD 1. "Go placidly amid the noise and haste. Remember what peace there may be in silence. As far as possible without surrender be on good terms with all persons." Desiderata.

WESTERN NEW YORK: SM, William Thompson, W2MTA—Appointments: W2LC ASM representative for counties of Cayuga-Madison-Oneida-Onondaga-Oswego-Seneca. ASM W2BCH continues with special assignments. Many thanks to ASM W2GJ for his long service as League representative in WNY's Southern Tier, he soon joins K4NK in South Carolina; (EC) N2WDS Allegany Co. CLUB NEWS: KB2ZFH is GRAM Ham-of-Year; KB3APR & N2OKU are CCARES Members of the Year. ARATS has renewed as Special Service Club for fifth year. 1998 OFFICERS: Binghamton ARA KB2SCF WS2U N2PQX N2NCB; Buffalo ARRA KG2DE N2QJE WA2CWF KD2JW KA2WIO KB2VKK N2WUV; Chenango Valley ARA N2RXK KB2KIR N2KYZ WA2EYH; GRAM KB2UQZ KB2ZFH KA2OQZ WA2JRR KB2YSI KB2ETL; Oneonta ARC N2WVX N2ZPV N2VPR N2NQH; Rochester VHF Group K2IV NS9E WY2Z WA2ZNC K2DH K2AN N2ODK.HAMFESTS: LARC@State Fairgrounds Syracuse April 25, Owego May 2, Rochester May 29-31, LARC@Darien Center June 7, SARC @ Cortland June 13, GRAM@Alexander July 12, UARC @Frankfort July 18, WNY Clubs Picnic July 26, NTS. Traffic Handlers Picnic in Elkins WV this year on Aug.22, TCARC@Dryden Aug.8, Rome@Westmoreland Aug.15, PROs@Chaffee Aug.29, MOARC Fly-in Breakfast @Durhamville Aug.30, Buffalofest @Hamburg Sept.19, Elmira@Horseheads Sept.26. Feb. BPL: KF1L, N2LTC. # Denotes NTS Net.

Net	QNI	QSP	QND
EBN-FM, 6.730	494	000	020
NYS RACES-SSB	082	007	004
NYS RACES-CW	020	004	004
#NYS/M-CW, 3677	219	114	028
CHN-SSB, 3925	216	139	028
#WDN/M-FM	454	065	029
#NY PHONE-SSB	300	352	028
#NYPON-SSB	320	238	028
ESS-CW, 3590	401	109	028
NYSPT&EN-SSB	289	037	028
#OCTEN.E-FM	1151	221	028
WDN/E-FM	419	065	028

Net	QNI	QSP	QND
#NYS/E-CW	306	185	028
OMEN-FM	025	001	002
STAR-FM	402	039	028
ONEONTA-FM	042	005	004
TIGARDS-FM	034	004	004
BRVSN-FM	227	007	028
#CNYTN-FM	292	047	028
#OCTEN/L-FM	576	237	028
#WDN/L-FM	344	039	028
#NYS/L-CW	199	112	028
WEST-FM/SSB	No Report		

* DenotesPublic Service Honor Roll

Traffic (Feb): N2LTC*1125, KF1L*530, KA2ZNZ*397, K2BCL*271, KA2GJV*270, W2MTA*268, WB2IJH*250, W2FR*189, NN2H*145, WI2G*140, N2OJI*138, KB2KOJ*111, NY2V*97, KB2TIY*95, WB2QIX*91, KG2D*76, KA2DBD*72, AF2K*70, N2CCN*67, N2WDS*61, KB2WII*59, KB2ETO*58, W4BNY*40, AA2ED*40, KC2CSQ*39, K2DN*39, W2PII*27, K2DYB*23, KA2QIK 12, N8JSO*9, KB2UQZ*9, WA2UKX*3. Datalink Reports RX/TX: K2DN 9/6; KA2GJV 60/17; N2LTC 247/148; NY2V 6/13; W4BNY 1/1. National Traffic System Managers: K2KIR/W2BC Eastern Area Net Cycles 3 & 4; W2MTA Second Region Net Cycles 2 & 3; New York State CW Nets— KA2GJV NYS Morning (10 AM), WI2G NYS Early (7PM), W2YGW NYS

Continued on page 118.

12 Store Buying Power!

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
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- 1000 Memory Scans
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- Wide Band Coverage: 100 kHz - 1.3 GHz ††
- All Mode, Including CW
- Unlimited Number of Memory Channels
- Includes: IC-PCR1000 Communications Receiver, Software, Telescoping Antenna and Cable Lead, RC-232C 6-pin cable, 120V AC adapter and Operators Manual.

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- Enhanced 0.03-200 MHz Broadband All Mode Receive, 100 W HF + 6M/20W 2M
- Slots for 2 Optional Crystal Filters

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- 2M/440 MHz
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- 9600 BPS Packet Ready
- CTCSS Encode/Decode
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- 2 meters
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NOW AVAILABLE!
IC-T8A includes BP-200

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- 70 Memories
- Great audio
- CTCSS Encode/ Decode Included

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- 2 M/440 MHz
- 5W @ 13.5 V
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- 200 memory channels with easy alpha naming
- VHF/UHF exchange function
- Unit to Unit/Computer to Unit Cloning Capabilities

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- PC Cloning, Downloading and Control

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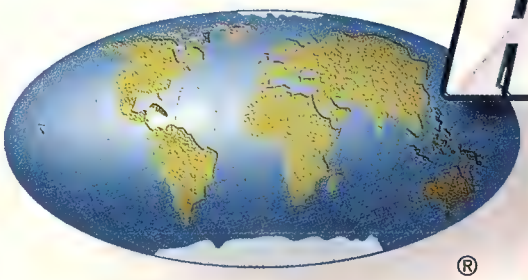

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Shown on the popular FT-50R by Yaesu. The antenna is only 1.75 inches tall, and exhibits surprising performance.

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Dual band Mobile Antenna with flexible whip..

The perfect antenna for high profile vehicles. The heavy-duty whip bends to enter garages, drive-thrus, etc.

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Very Flexible!

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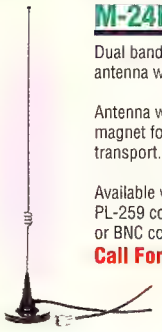

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Dual band 2M/70cm mag mount antenna with 12' RG-58/U coax.

Antenna whip unscrews from the magnet for easy storage and transport.

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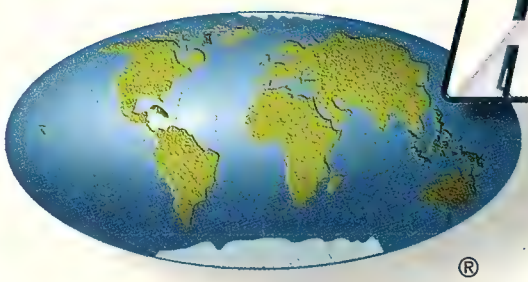

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ADI

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- Wide receive 130-180 MHz
- Built-in CTCSS enc./dec.
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AT-600HP 2M/440 Handheld

- Wide receive from 100-174, 340-480, and 850-985 MHz (cellular blocked)
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(AR-446 also shown)

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- 3 select. pwr. settings (5/10/50w)
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Contemporary design, quality and a 1 year warranty on parts and labor. 1 year on the RF Final transistors.Most amplifiers have GaAsFET receive pre-amps and high SWR shutdown protection

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40' Tubular Tower

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There is little to beat the sheer pleasure of owning and driving a performance car. But an alternative way to enjoy first-class convenience on the road is Kenwood's new TM-G707A, an FM dual-bander (144MHz/440MHz) expressly tailored for your cruising comfort.

TM-G707A FM DUAL BANDER

Power up and you're greeted by the welcoming glow of an amber-colored LCD. You can always be sure of a friendly reception from Kenwood's TM-G707A, an FM dual-band transceiver that is a joy to use.

For some drivers, visibility is everything. That's why the TM-G707A has an extra-large display. Capable of showing up to 7 large characters, the **high-visibility amber LCD** features a 4-step dimmer control to suit all driving conditions, day or night. A convenient touch is the automatic brightness control during operation.

The TM-G707A is simple and straightforward like a car stereo, thanks to **Easy Operation** mode. You just choose a frequency and press one of the 3 quick memory keys to save it. A light touch on the same key is all that is needed for recall. And with the **Five-in-one programmable memory system**, you can store five operating profiles - complete with frequency range, dimmer level, and other details - ready for instant recall at the push of a button.

Another convenience that is especially welcome on the road is the **Memory Name** function. This allows you to identify each memory position with up to 7 alpha-numeric characters. You can also switch instantly between the frequency and Memory Name displays.

Optimized convenience goes hand in hand with polished performance and a wide range of advanced features, such as a built-in **CTCSS encoder/decoder, built-in duplexer** and **priority scan.** The front panel features a 6-pin **mini DIN connector** for either standard 1200bps or 9600bps high-speed packet or APRS communications. Also, **180 multi-function memory channels** are available for storing such data as transmit and receive frequencies independently (thus allowing split-frequency operations), frequency step, and tone frequency. Among the many options available is a **quick-release detachable front panel kit** for anti-theft protection.

There's an open road ahead for the future of mobile communications, and Kenwood's TM-G707A is showing the way.

- **Power output 50W VHF, 35W UHF**
- **Wide range coverage (including aircraft receive)**
- **Superior intermodulation rejection characteristics**
- **Heavy-duty heat sink construction**
- **PC programmable**
- **Supplied MC-53DM multi-function backlit microphone with DTMF**
- **Full band scan, program band scan, memory scan with memory channel lock-out, MHz scan and call scan with TO (time-operated) or CO (carrier-operated) resume modes**
- **CTCSS tone scan**
- **Voice Guide (requires VS-3 option)**
- **Selectable frequency step (5, 6.25, 10 12.5, 15, 20, 25 or 50kHz)**
- **Incremental MHz Key**
- **AIP (Advanced Intercept Point)**
- **Memory shift (odd splits)**
- **S-meter squelch**
- **Auto repeater offset (144MHz)**
- **Power-on message**
- **3-position RF output power control**
- **Time-out timer (TOT)**
- **Auto power-off circuit**

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2 - 3CX800A7 EIMAC TRIODES
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160 - 10 METERS (WITH LICENSE)
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Late (10 PM); N2LTC New York Phone Net (1 PM); N2YJZ New York Public Operations Net (5 PM); WA2PUU CNYTN; KA2ZNZ OCTEN E & L; N2NCB STAR; AF2K WDN/M; N2JRS WDN/E; KB2TIY WDN/L. May flowers bring hamfests! See you at the Atlantic Division Convention in Rochester on May 30! 73 from w2mta@juno.com.

WESTERN PENNSYLVANIA: SM, Bill Edgar, N3LLR—ASM: N3MSE. ASM-ARES: WB3KGT. SEC: N3SRJ. ASM-Packet: KE3ED. STM: WB8KPE. TC/OOC: WR4W. ACC: AK3J. PIC: W3CG. DEC-SO: KD3OH. DEC-N2: N3NIA. DEC-S1: KA3HUK. DEC-S2: N3PHF. Still have some dates open for club presentations. Several members of the WPA section staff have indicated a willingness to attend meetings to talk on various topics. If your club would like to have such a presentation, please let me know. I recently had the pleasure of attending a meeting for a new club in Western PA. The Ellwood City Amateur Radio Club had asked Carl Sacherich, N3OLA, to do a presentation for their club on the ARES program. The El Nino weather patterns this year have been very generous so far to Western PA. However, typically, thunderstorm and severe storms become more frequent in the spring and summer. Has your club or ARES unit scheduled SKYWARN training this year? This is one area that we hams can help provide a necessary and much needed public service. Field Day is fast approaching and is scheduled for the weekend of June 27 and 28. John Rodgers and I will be making visits to various Field Day sites around the section. I would like to get a listing of the various sites so that if we are in the area, we can stop in for a visit. We are working on a video showing various Amateur Radio activities around our section so this can be used as a recruiting or training film for the hobby. Rich Beaver, N3SRJ, our WPA Section Emergency has been on the move. Have been a number of ARES leadership appointments announced recently. Two new District Emergency Coordinators have been appointed: Larry Bertoncello, KA3HUK for South 1 and John Miller, N3NIA for North 2. Three new Emergency Coordinators have been appointed: Bob Livrone, N3WAV, for Westmoreland County; John Miller, Jr. N3XST, for McKean County and Ray Albert, N3XCD, for Butler County. February 1998 Station Reports: Station, QTC; W3OKN * 192, WA3UNX 119, N3COR 73, W3NGO 65, W3GJ 59, N3ON 40, N3WAV 39, N3KB 30, WB8KPE 27, KC3NY 22, WA3QNT 18, N3PBD 16, KB3IN 1. * PSHR 1/60 2/24 3/24 6/20 total 128. February 1998 Net Reports: Net, Mgr, QTC, sess; WPA Phone N3KB 121, WPA CW N3COR 98, NWPA2MTN WA3ZSC 36, Erie Mailbag N3PBD 18, WPA2MTN WA3HJC 36. 73, Bill Edgar, N3LLR,WPA-SM.

CENTRAL DIVISION

ILLINOIS: SM, Bruce Boston, KD9UL—SEC: W9QBH. SGL: WA9AQN. ACC: N9KP. STM: K9CNP. PIC: N9EWA. TC: N9RF. OOC: KB9FBI. It's not too late to join the select few who will sport this year's Field Day license plate. These special event Illinois plates can be displayed on your vehicle throughout May and June, and they are available for $35 from the Sangamon Valley RC. Contact Dick Drew, KØHMO, during the day at 217-529-0667 or evenings at 217-787-4542 for more information. The new officers for the SVRC are pres KOHMO, vp K9YMT, sec KA9KQH, trea KB9BIV. K4CEO (ex N8CEO) has been named the Ham of the Year by the Fox River Radio League. This year's recipient has served as the hamfest chairman for three years and as a director of the club. The Metro ARC has decided to have trees planted in Israel's Silent Key Forest in memory of W9IWI. Members of the York RC assisted with the Elmhurst St Patrick's Day Parade. The YRC has formed a Welcome Committee to help new members become comfortable with the group. Committee will develop a welcome package containing club information, a copy of the newsletter, the by-laws, and other materials. Committee members will also encourage new members to attend meetings and greet them upon arrival to help them feel at home. Summer is some distance away, but the Schaumburg ARC is already making plans for a club picnic Aug 23. The 1998 officers of the Western Illinois ARC are pres N9DT, vp WØKT, sec KBØVJF, trea N9KUT. The Egyptian RC can now be found on the Web at www.mebcs.com/w9aiu. According to the ERC newsletter, *Podunk News*, several amateurs will operate local dxpeditions from uninhabited islands on the MO/IL border this summer. If you search for more distant DX and use the incoming QSL bureau, be sure to check with them periodically to make sure they are supplied with your envelopes. Confirmation of that rare QSO may end up in the "round file" if they don't have them. The incoming QSL bureau for region 9 is the Northern Illinois DX Assn, PO Box 1450, Woodstock, IL 60098.

Net	*Freq*	*Time (Local)*
ISN	3.905	1800 Daily
ILN	3.665	1830 & 2200 Daily
ITN	3.680	1900 Daily
CTN	147.090+	2100 Daily
IL ARES	3.905	1630 1st & 3rd Sunday
Macon Co	442.250+	2100 Wednesday
IEN	3.940	0900 Sunday
IPN	3.855	1645 M-F; 0830 Sunday
NCPN	3.912	0700 Monday-Saturday
NCPN	7.270	1215 Monday-Saturday

February traffic: W9HLX 156, K9CNP 118, NS9F 55, KA9IMX 39, WB9TVD 32, NC9T 20, W9FIF 9, WA9RUM 6, WD9MII 2. W9VEY Memorial Net de K9AXS 6 with 222 check-ins. ISN REPORT QNI 225, QTC 72, sess 26. Ninth region C4 report—traffic 189—56 sessions—340 min—avg 3.37—rate .555—percent rep 97%—QNI—IL—K9CNP KF9ME NS9F. ILN/K9CNP QTC 27 in 56 sessions. ITN/KF9ME QTC 18 in 26 sess NCPN/W9OUF QTC 67 IN 24 sess IP N/KA9CYJ QTC 33 in 24 sess IEN/K9HEZ QTC 3 in 4 sess.

INDIANA: SM, Peggy Coulter, W9JUJ—SEC, K9ZBM; ASEC, WA9ZCE; STM, AA9HN; OOC, KA9RNY; SGL, WA9VQO; TC, W9MWY; BM, KA9QWC: Sympathy extended to the families and friends of Silent Keys. 2/15, Harold C. Ludeker, WA9JNC, Milan; 2/17, Eldon Wood, W9MGV, Fort Wayne; 2/21,Harold "Pat" Pyle, W9PSD, Greenwood; and 2/25, C.Gardner Martin, K9FVL, Camden. Reminding everyone if you know someone that is deserving of the Indiana Amateur-of-the-Year Award to please

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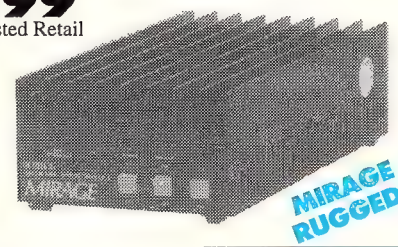
Turn your mobile, base or handheld into 160 Watt powerhouses and talk further, longer, clearer . . . All modes: FM, SSB, CW . . . Superb GaAsFET preamp . . . Overdrive, high SWR, Over-temperature protection . . . Remote controllable . . .

B-5016-G
$299
Suggested Retail



Power Curve -- typical B-5016-G output power								
Watts Out	130	135	140	145	150	155	160	165
Watts In	20	25	30	35	40	45	50	55

The MIRAGE B-5016-G gives you 160 watts of brute power for 50 watts input on all modes -- FM, SSB or CW!

Ideal for 20 to 60 watt 2 Meter mobile or base. *Power Curve* chart shows typical output power.

Hear weak signals -- low noise GaAsFET preamp gives you excellent 0.6 dB noise figure. Select 15 or 20 dB gain.

B-5016-G has legendary ruggedness. *We know of one that has been in constant use since 1979!*

Heavy-duty heatsink spans entire length of cabinet -- prevents overheating. Power transistors protected by MIRAGE's *Therm-O-Guard*™.

Fully protected from high SWR and excessive input power. Has warning LED.

Has smooth adjustable Transmit/Receive switching with remote external keying.

RC-1B, $45, Remote Control. On/Off, pre-amp On/Off, selects SSB/FM. With 18-ft cable.

Draws 17-22 amps at 13.8 VDC. 12x3x5½ in.

More 160 Watt, 2 Meter Amplifiers . . .

B-2516-G, $299. For 10 to 35 watt mobile or base stations. 160 watts out for 25 watts in.

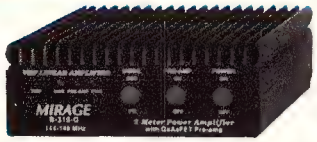
B-1016-G, $379. MIRAGE's most popular *dual purpose* HT *or* mobile/base amplifier. 160 watts out/10 W in. For 0.2-15 watt transceivers.

B-1016-G Great for ICOM IC-706!

B-215-G, $379. MIRAGE's most popular *handheld* amp. 150 watts out/2 watts in; 160 watts out/3½ W in. For 0.25 to 5 watt handhelds.

00 Watts for 2 Meter HTs

B-310-G
$199
Suggested Retail
MIRAGE RUGGED!



Power Curve -- typical B-310-G output power							
Watts Out	25	50	75	95	100	100+	100+
Watts In	¼	½	1	2	4	6	8

- *100 Watts out with all handhelds up to 8 watts*
- *All modes: FM, SSB, CW*
- *Great for ICOM IC-706*
- *15 dB low noise GaAsFET preamp*
- *Reverse polarity protection/SWR Protection*
- *FREE mobile bracket* • *Auto T/R switch*
- *FREE handheld BNC to B-310-G cable*
- *Ultra-compact 4¾x1¾x7¾ inches, 2½ pounds*
- *One year MIRAGE warranty*

***Boost** your 2 Meter handheld to 100 Watts!* ra-compact all mode B-310-G amp is perfect for handhelds up to 8 watts and multimode SSB/CW M 2 Meter rigs. *Great for ICOM IC-706!*

35 Watts for 2 Meter HTs

B-34-G
$89.95
Suggested Retail

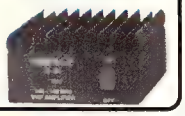
Power Curve -- typical B-34-G output power								
Watts Out	18	30	33	35+	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7	8

- *35 Watts Output on 2 Meters*
- *All modes: FM, SSB, CW*
- *18 dB GaAsFET preamp*
- *Reverse polarity protection*
- *Includes mobile bracket*
- *Auto RF sense T/R switch*
- *Custom heatsink, runs cool*
- *Works with handhelds up to 8 watts*
- *One year MIRAGE warranty*

MIRAGE RUGGED!

35 watts, FM only . . . $69.95

B-34, $69.95. 35 watts out for 2 watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛x1¾x4¼ inches.



MIRAGE Dual Band 144/440 MHz Amp

BD-35
$159.95
Suggested Retail

MIRAGE RUGGED!

Power Curve -- typical BD-35 output power							
Watts Out (2Meters)	30	40	45	45+	45+	45+	45+
Watts Out (440 MHz)	16	26	32	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7

- *45 Watts on 2 Meters/35W on 440 MHz*
- *Auto Band Selection* • *Auto T/R switch*
- *Full Duplex Operation* • *5x1¾x5 inches*
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- *Single Connector for dual band radios and antennas*
- *Reverse polarity protection*
- *Works with all FM handhelds to 7 watts*
- *One year MIRAGE warranty*

Add this Mirage *dual band* amp and boost your handheld to a *powerful* mobile or base -- 45 watts on 2 Meters or 35 watts on 440 MHz! **Mirage's** exclusive *FullDuplexAmp*™ lets you talk on one band and listen on the other band at the same time -- *just like a telephone conversation.* (Requires compatible HT).

Meter Amplifier (50-54 MHz)

CC Type Accepted

The A-1015-G, $389, is the *world's most popular* all mode FM/SSB/CW 6 Meter amplifier. 150 watts out for 10 in. For 1 to 15 watt transceivers.

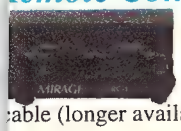
0cm Amplifiers (420-450 MHz)

D-3010-N, $365, -- 100 W out/30 in. For 5 to 45 watt *mobile/base*. **D-1010-N, $395,** 100 W out/10 in. *Dual urpose* -- for handhelds or mobile/base. **-26-N, $269,** 60 W out/2 in, for *handhelds*.

Amateur TV Amps

Industry standard ATV amps -- **D-1010-ATVN, $414,** 82 watts PEP out / 10 in. **D-100-ATVN, $414,** 82 watts EP out/2 in. (without sync compression).

Remote Control Head for Amps



RC-1, $45, remote controls most MIRAGE amps. Power On/Off, preamp On/Off, switch for SSB/FM. 18 foot able (longer available). 1¾x3¾x2½ inches.

Repeater Amps

11 models -- continuous duty all modeFM/SSB/CW repeater amps for 6, 2, 1 1/4 Meters, 70cm, 450 MHz ATV.

Low noise GaAsFET preamps

High gain *ultra low noise* GaAsFET preamps for receiving weak signals. Selectable gain prevents receiver intermod. 15 to 22 dB gain. Less than 0.8 dB noise figure. Automatic RF switching up to 160 Watts. **Choose** In-*Shack* model or *Mast-Mount* (includes remote control) model to reduce loss. Rugged die-cast enclosure.

KP-1

KP-2

Frequency (MHz)	*In Shack $139*	*Mast Mount $195*
28-30	KP-1/10M	KP-2/10M
50-54	KP-1/6M	KP-2/6M
144-148	KP-1/2M	KP-2/2M
220-225	KP-1/220	KP-2/220
430-450	KP-1/440	KP-2/440

1¼ Meter Amps (223-225 MHz)

Choose from 10 models -- 20 to 220 watts out for 2 to 50 watts in, $129 to $655.

Commercial Amps ($199 to $395)

FCC Type Accepted

Commercial amps for 150 - 174, 450-470 MHz and VHF marine bands, 70 -130 watts out.

Accurate SWR/Wattmeters

Read SWR directly andForward/ Reverse, Peak/Average power. Remote Coupler. 1.8-30, 50-200, 420-450, 1260-1300 MHz band models.

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- Wouldn't you rather make precise gap adjustments with instrument knurled heads on fine pitched screws and locking nuts—without having to find the hex wrench—You Bet You Would! The KENT design makes it easy with just thumb and finger.
- Wouldn't you rather have the ruggedness of components made from machined, polished solid brass contained within a permanent brass housing instead of components hung together with only spring tension—You Bet You Would! If you drop the KENT on your desk it won't "explode" in many little pieces like some other designs.
- Fully assembled and tested by Alpha Delta. Designed and produced by R.A. KENT Engineers-England. All models use ball bearings and brass designs. Paddle models use non-skid heavy steel bases.

And what about CW? There is nothing low-tech about CW. It was—and is—the purest form of digital communications (on-off, ones and zeros) and modern forms of these techniques have evolved from the basic CW algorithms.
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- **Model TP-1 (Twin Paddle) $149.95 ea.**
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- **Complete kits with preassembled bearing blocks are available from Alpha Delta—subtract $15.00 from any model above.**

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T8	8	13-32 MHz	18 FT	$555.00
T10	10	13-33 MHz	24 FT	$695.00
T12	12	13-33 MHz	30 FT	$855.00
T24	24	28-1300 Mhz	12 FT	$365.00
T31	31	50-1300 MHz	12 FT	$295.00
T620	6	20 MHz	27 FT	$895.00

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PH/FAX 915-446-4510

send in nominations to the IRCC. It is awarded in July, it isn't too early to submit them now. Send to me and mark on envelope: IRCC Amateur-of-the-Year. I will forward to committee. Congratulations to newly appointed DEC of Area 6, Robert E. LaGrange, N9SIU. ECs of Area 6 should send him your monthly reports.There was a big increase of ARES members of 25. There were 24 ECs reporting. These reports are very much appreciated. If you would like to have me at your hamfest please let me know. Send me an invitation I will be there if at all possible. There is a need for nominations for candidates for NTS possible appointment within the Central Area for Regional Digital Coordinators. In addition, one individual to perform the duties of Area Digital Coordinator. These amateurs should have Amateur Radio PACTOR, CLOVER or AMTOR abilities and be ARRL members. If you qualify let me know. NMs ITN/W9UMH, QIN/WB9TUS, ICN/AA9HN, WN/WA9OHX, VHF/AA9HN.

Net	*Freq*	*Time/Daily/UTC*	*QNI*	*QTC*	*QTR*	*Sess*
ITN	3910	1330/2130/2300	2179	1252	392	56
QIN	3656	1430/0000	338	108	835	53
ICN	3705	2315	114	33	462	26
IWN	3910	1310	2137	–	280	28
IWN VHF Bloomington			409	–	420	28
IWN VHF Kokomo			668	–	140	28
IWN VHF Northeast			833	–	560	28
Hoosier VHF nets (9 nets)			681	76	955	48
D9RN				no report		

9RN had 56 sessions with QTC 189. IN represented by KO9D, WB9TUS, KG9LI, W9CSJ, WB9UYU, WA9QCF, AA9HN, N9HZ and W9FC. Tfc: W9FC 203, KO9D 132, W9UMH 94, WB9QPA 82, K9GBR 70, K9PUI 60, WB9TUS 53, AB9AA 51, W9JUJ 42, KA9DIG 38, W9UEM 31, WA9QCF 23, KB9NPU 22, AA9HN 20, KA9EIV 18, N9WNH 16, K9RPZ 14, W9CSJ 12, KA9QWC 11, W9BRW 10, K9DIY 10, W9EHY 7, W9NCE 6, K9OIM 4, N9JAI 3.

WISCONSIN: SM, Roy A. Pedersen, K9FHI—SEC: WB9SMM. STM: KA9KLZ. ACC: KF9ZU. SGL: W9RYA. OOC: W9RCW. PIC: K9ZZ. TC: K9GDF. ASM: W9CBE, K9UTQ. BM: WB9NRK. Are your ARRL appointments up to date? Please check the dates. They are automatically endorsed by ARRL, however if you are not active, they can be cancelled. Anyone who has a Heathkit and needs parts or whatever else, contact WA9ZTY, Rob, in Marshall, he has other things for sale also. C4 represented by N9KHD, K9LGU, W9CBE, W9YCV, N9CK and W9UW, thanks for your support guys. Ozaukee Radio Club used to have a Christmas party, then changed that to the following, Post Christmas, Post New Years, Post Valentine Day and is now Post Everything Party (ORC newsletter) For those that would like to contact Robert Graham (K9SAO) now W5FBO, his address is 6704 Lyrewood Ln. Apt.54 Oklahoma City, OK 73132-6312. Art Kratz, N9TD, is a Technical Specialist. Ozaukee ARC program for March is the visit to UMW Planetarium. I know this is very interesting as we saw the one at Oshkosh a few years ago.(ORC newsletter).When you are going on a Fox hunt, be sure your gas tank is full (QSO'r).Hamfests coming up are May 2 Cedarburg, May 9 Manitowoc, June 7 Junction City (WNA meeting also), July 11 Oak Creek, July 27 Racine, November 8 Kaukaukana. Field Day June 27 and 28, hope to hear you on. New officers Mancorad club: pres W9NPX, vp W6BSF, trea.AA9MT, sec KB9GOY, Board of Directors K8KQA, N4WGK, N9IQZ. I regret to report WA9UPE, and KD9OC as Silent Keys. WNA meeting on the air was well attended, lots of things discussed, next meeting will be at Junction City June 7. Please attend. Thought for the day: A fishing enthusiast thinks that fish should bite on a fancy lure just because he did. Tfc: K9JPS 875, W9RCW 822, WB9JSW 710, W9IHW 623, W9CBE 247, K9FHI 174, N9KHD 121, W9YCV 97, N9BDL 87, KA9KLZ 86, AG9G 66, K9RTB 63, N9CK 55, W9UW 47, KA9BHL 46, KE9VU 46, KG9B 38, KA9FVX 36, K9LGU 34, WD9FLJ 32, K9GU 28, K9HDF 25, W9ODV 24, WB9ICH 22, N9JIY 9, W9PVD 1.

DAKOTA DIVISION

MINNESOTA:SM,Randy "Max" Wendel, NØFKU—Please take note, all ARRL members in MN: Nominations are now being solicited for the elected official appointment of Section Manager (SM). To elect a new SM or reinstate the incumbent SM, a nomination form must be sent to ARRL by June 5 (see solicitation in April/May *QST*. It's been one of my goals to increase awareness of the field organization in MN, and I encourage all of YOU to participate and play a part in the process of our FO and section activities. Please consider a nomination as you see fit and elect or re-elect a candidate SM to carry out the important section activities of the field organization right here in our state. In other news, the El Nino sure gave us a winter we won't forget. Sure feel sorry for the many folks around coastal states who fell victim to the floods and tornadoes. As we now enter into our tornado season, be sure to be SKYWARN certified and attune to good spotting observations and communication protocol used during these events. Just a reminder that a few months back I mentioned that we had an opening for a Technical Coordinator (TC). Be advised I've had no one step forward and volunteer. Hams can be a valuable resource to one another if we can "pool together." If a ham has a technical matter or question, who might be his/her first call for help? The TC! In turn, the TC refers them to a Technical Specialist (TS) who may be knowledgeable on that subject and lend a helping hand or suggestion. We need a TC with an interest in organizing that pool of TSs. Please let me know (*QST* p 12) if you are interested. At this writing, a new Day-Ten Regional Net Mgr was being sought. By the time you read this, I'm sure a new one will have volunteered, but I'll pass along the info next month. Don't forget Rochester hamfest April 25. I'll be just getting back from the IWCE (communications) conference in Las Vegas, with hopefully a few bucks left over to buy a hot dog or two at the fest! Is it spring yet? 73 NØFKU. Tfc: WBØWNJ, KBØAII, WAØTFC, WØLAW, WØGRW, WØHPD, WOØA, KØPIZ, KNØU, KBØAIJ, W3FAF, KØWPK, NØJP, WDØGUF, KBØOHI, NØAU, KØOGI.

NORTH DAKOTA: SM, Bill Kurtti, WCØM— 35th annual Peace Garden Hamfest coming up July 10-12. Great weekend of ham activity for the entire family. Many start coming a week early. Part 4 of 4 Salvation Army report by NØRDJ

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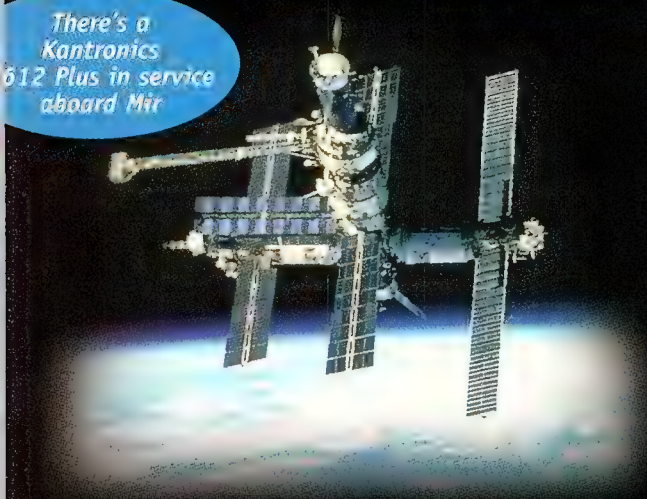

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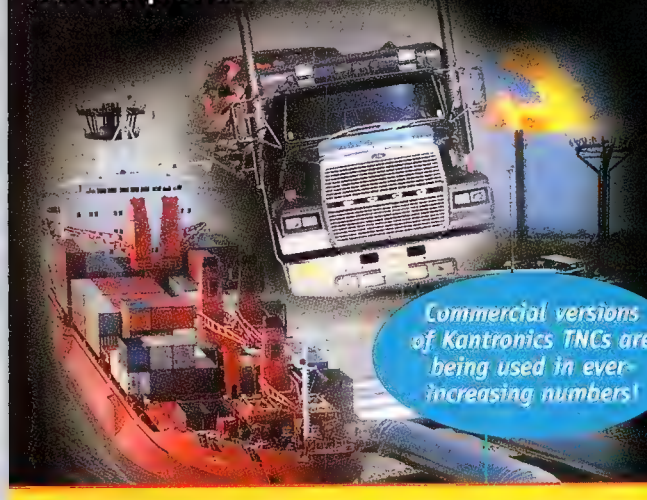

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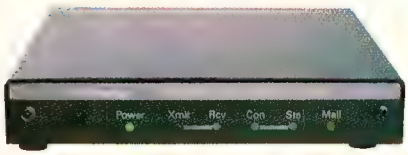

8.2 Firmware now with Advanced GPS/APRS UI digipeating available for all 4 models!

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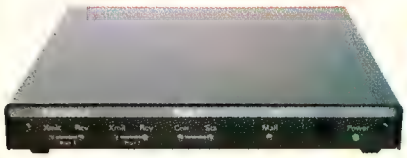
KPC-9612 Plus



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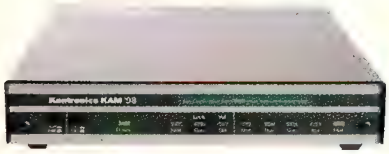

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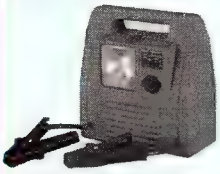

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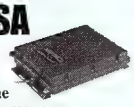

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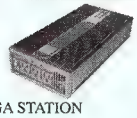

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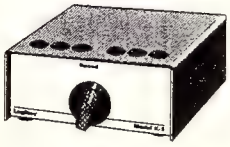

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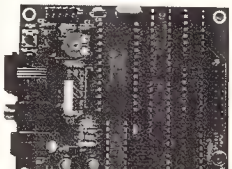

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follows. Hams helping in the Salvation Army effort were KØCLD KAØSOM WB8BZH KAØHSS KBØTIY KBØVUR KCØAQX NØDK KØUB NØQLQ NØELA WDØDAJ T94OF KA9TRG KØHXL KBØCIR AAØHL KBØOFI NØLWY WØOFP WBØJGM KBØTXE WW9E NØMWV KØATI KEØXT KBØPMT WBØOAJ KAØSPH. RRRA Ham-of-the-year for 1997 is KGØFR, Congratulations Mark. We all know the effort you put into ham radio. Also a word of thanks to WDØAKO for acting as publisher for the RRRA newsletter for the last 10 years. For Internet fans several ND clubs now have home pages. Fargo's is http://www.rrra.org. Grand Forks is http:/ /people.aero.und.edu./~morganj/ARES. The mild winter brought with it a lot of fog & drizzle instead of the usual dry snow causing a lot of antenna problems for us. I am looking for a traffic mgr. Anyone interested please contact me. Net Reports: Goose River net 8:30 AM Sunday 1985KC 4/62/0 // Data Net 6:30 PM daily 3937 KC 28/549/18 // WX Nets 8:30 AM 12:30 PM 3937 KC 45/1167/56 KEØXT HF NM.

SOUTH DAKOTA: SM, R.L.Cory, WØYMB— Dakota Chapter 102 QCWA operated their special-event station WØDAK, on Feb 21-22, to celebrate their 21st year. It was a very successful event. Many stations were looking for a contact with this special-event station. I regret to report South Dakota Silent Keys, Edward Elon, WØAPL, Lead, Daniel Weiers, WØRWX, Piedmont, and Karl Bates, WBØYCM, from Watertown. All were well known South Dakota hams and will be missed. Lark at Watertown for the fifth year operating a special-event station at the Winter Farm Show on Feb. 14-15 to demonstrate ham radio to the public. Our director Tod Olson, KØTO, has announced he will not seek reelection as Dakota Division Director in year 2000. The Pierre ARC is putting a 145.2 tone on their 145.350 repeater to cut down on intermod interference turning on the repeater. AAØCT has suffered a broken leg in a fall. We wish him a speedy recovery. Black Hills ARC on Feb 21 held their annual fund raiser auction and dinner. 32 persons attended the dinner. At the VE test session only one person tested and passed code to upgrade to Tech Plus. Hope to see everyone at the combined Midwest Dakota Division Convention May 29-30 at South Sioux City, Nebraska. Total traffic 855.

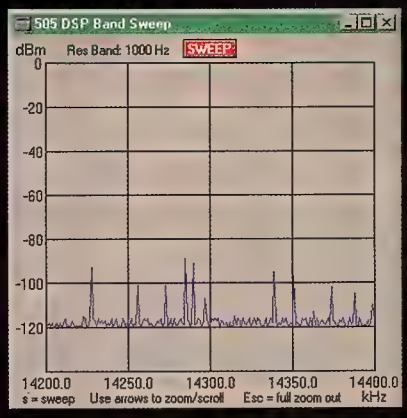
DELTA DIVISION

ARKANSAS: SM, Roger Gray, N5QS, e-mail n5qs@arrl .org —At the time I am writing this,the hamfest season has begun with a bang in Arkansas. I attended the Russellville hamfest 2 weeks ago and it was the largest and best attended hamfest I have seen there since I have been involved with Amateur Radio. I sincerely hope this good beginning for the year indicates the response we will be having over the next few months. I want to announce the appointment of a new Section Emergency Coordinator. Terry Busby, KC5ARS, has agreed to assume these duties. Terry will be replacing Kenny Thompson, KG5KS, who has done a very good job over the past year and is stepping down due to job conflicts. Kenny will be helping Terry during the transition. I want to thank the University of Arkansas at Little Rock for providing space for the Arkansas Section home page, check it out at http://www.ualr.edu/~ham2/ Tfc: W5QFU 47, K5BOC 29, AB5ZU 17,W5HDN 11,WA7WFU 7,KC5UEW 2. PSHR: W5RIT 106 (Jan) W5RIT 85 (Feb).

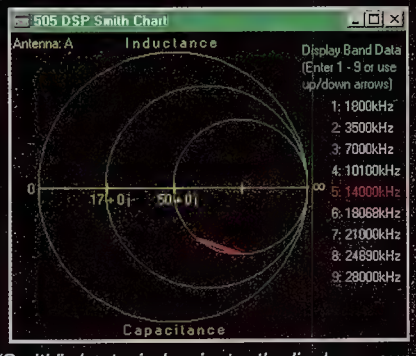
LOUISIANA: SM, Lionel A "Al" Oubre, K5DPG, e-mail k5dpg@arrl.org. Web Page www.aisp.net/k5dpg—ASM: KB5CX. ACC: KA5IJU. BM: K5ARH. TC: KE5FZ. SEC: KA5YDJ. OOC: WB5CXJ. PRC : KB5QVI. STM: KG5GE. NM LTN: WB5ZED. NM LSN: WB5CDX. NM LCW: W4DLZ. From time to time a program comes along that needs everyone's support. Thanks to Gloria J Graham, KC5LYD, of Baton Rouge, such a program is the ARES Blood Group at Our Lady of the Lake Hospital in Baton Rouge. Every Amateur Radio operator and members of their immediate family can draw blood from this group. To keep the group current, we must donate to the blood bank each year. All one needs to do is go to a local blood bank and donate blood and tell them to credit this to the ARES group at Our Lady of the Lake Hospital in Baton Rouge, LA and then send an e-mail to *nv5a@aol.com* or a message to Gloria via the NTS giving the date, location, your name and call sign. This will ensure that the ARES Group gets credit. New Club Officers: JARC pr WD5BJW, vp WA9TMC, sec WA5TRX, tr W5RMX.Up coming hamfests are: Baton Rouge May 1 & 2, Slidell July 18, NO IDXC August 14-15, Alexandria Sept 19, Monroe Nov 7. Reports for Feb 1998: LTN QNI 336 QTC 120 sess 28; LSN QNI 29 QTC 14 sess 20; LCW QNI 149 QTC 60 sess 28; DRN5 LA Represented 100% by KG5GE K5WOD, K5IQZ, WB5ZED, WB5CDX, AB5YS, N0KWA, K5DPG. PSHR: WB5CXK 85, KG5GE 110, WB5CDX 121, K5WOD 126, K5IQZ 131, K5DPG 148, WB5ZED 154, K5MC 340. Tfc: WB5CXK 8, N0KWA 14, K5WOD 17, KG5GE 25, K5DPG 36, W4DLZ 46, WB5CDX 70, K5IQZ 125, WB5ZED 134, K5MC 514 (BPL medallion).

MISSISSIPPI: SM, Malcolm Keown, W5XX, e-mail: w5xx@magnolia.net. W5OXA has found it necessary to relinquish the position of Section Manager for the remainder of his term. Ernie, thanks for your tireless efforts on behalf of Mississippi ARRL members! Also thanks to AB5WF and his crew for hosting an outstanding ARRL State Convention and Jackson Hamfest with over 1200 in attendance. In particular, JARC members WB5GFM, N5WWN, KC5JIW, K5XU, KK5ME, KC5OSM, KG5YV, KB5CO, KM5GE, KB5PFR, KC5ZJE, and KD5ALJ put in a lot of hours to make the hamfest successful. Rough weather struck Central Mississippi on Feb 10. The SKYWARN Net was activated at the NWS in Jackson by AB5WF, KG5YV, and KC5GHS, and in Vicksburg KB5WJJ and K5VXV activated the MS-LA Weather Net. Welcome to N4VHX as new manager of the Magnolia Section Net. MS represented 98% of the time on DRN5 by NS5M, W5OXA, N5XGI and KD5P. Support our nets: Net/Sess/QNI/QTC/NM/Freq/Time: MBN 4/25/ 0/KK5EK; 3862/1330 (Sun); MSN 28/943/4/N4VHX 3862.5/0600/(weekdays) 0700 (weekends); MSPN 28/ 2377/38 W5XX/3862/800; MSSN 20/100/3/KI5UK/3688/ 1900; MTN 28/167/65/KB5W/3665/1845. LARC 4/90/0/ KB5IXJ/146.61-/1930 Tue; MLEN 4/98/1/KB5WJJ 147.27+ /2100 (Sun).

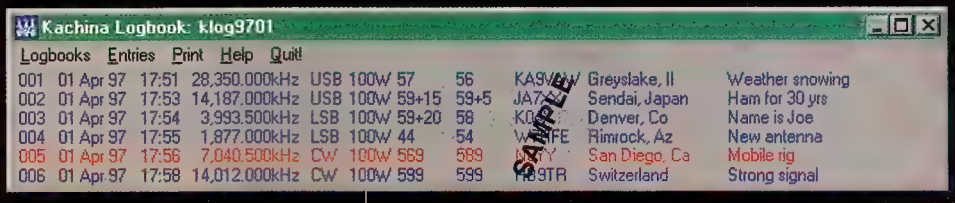
TENNESSEE: SM, O. D. Keaton, WA4GLS—ACC: WA4GLS. ASM: WB4DYJ. PIC: W4TYU. SEC: WD4EKA. STM: WA4HKU. OOC: AD4LO. TC: KB4LJV. MARC now has new call sign, "W4GGM." This was the call sign of Finis Allen, a pioneer of 2-meter FM and a long time member, also the club selected Gail, N4AUF, for the, "Ham of the



"Band Sweep" window allows you to look for the pile-ups. "Point and click" the mouse to instantly change frequency and join in.



"Smith" chart window instantly displays your antenna Z for the entire band.


Kachina Logbook: klog9701
Logbooks Entries Print Help Quit!
001 01 Apr 97 17:51 28,350.000kHz USB 100W 57 56 KA9W Greyslake, Il Weather snowing
002 01 Apr 97 17:53 14,187.000kHz USB 100W 59+15 59+5 JA7 Sendai, Japan Ham for 30 yrs
003 01 Apr 97 17:54 3,993.500kHz LSB 100W 59+20 58 K0 Denver, Co Name is Joe
004 01 Apr 97 17:55 1,877.000kHz LSB 100W 44 54 W FE Rimrock, Az New antenna
005 01 Apr 97 17:56 7,040.500kHz CW 100W 569 589 N Y San Diego, Ca Mobile rig
006 01 Apr 97 17:58 14,012.000kHz CW 100W 599 599 HB9TR Switzerland Strong signal
SAMPLE

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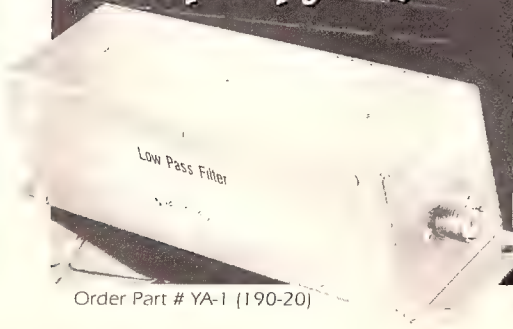

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Year." James Butler, KB4LJV, TC for the TN Section had a very good article in the Feb issue of "SPARKS" concerning parts for a computer tester and the places to get them cheaply. Thanks to RACK members who assisted in two events sponsored by the Knoxville Track Club, Merl, KD6FBT; Angela, N4RPR; Tim, KE4OTZ; Ingrid, KD4LDL; Rich, ND4F; Steve, KF4BTO; Tim, KD4WYI; Frank, N4OQJ; & Tristan. JCARC promoted its first Annual East TN QRP Moonshine Run on Sat Feb 28; scores will be reported when complete. Tri-County (Dresden), had good turnout at its Feb meeting in McKensie. The article on QRP by Dan Wolfe, N4ROA, that appeared in, *Zero Beat*, Feb issue was very informative. Thanks to the following BARC members who assisted in the recent flood disaster; KF4IIL, WD4EKA, N4AFV, KF4NRI, WD4PIW, W3YAE, KT4SQ, W4VS, KA4CWA, W4JH, N4ZS, W4FXO & KF4FEQ. Much thanks to KD4EHC and the other CARC members who assisted the MS 150 "TOUR for CURE," the activities contained 165 cyclists, 17 hams, 5300 miles. ORARC is conducting lesson for those who want to upgrade to General Class, contact Doug Campbell, N1CWR, for more information. W4NPL, AD4WB & KB4PNG, of the BSFARC took part in the snow relief effort during the recent snow storm in northern TN and southern KY. DRN-5 rpt, sess 56, msg 655, TN rep. 92% by W4OGG, W4MML, K4WWQ & WB4GIJ. Tfc: TMPN 28/30/2198; TCWN 24/33/195; TEMPN 20/20/597; TEPN 23/93/2887; TSCWN 21/10/80.

GREAT LAKES DIVISION

KENTUCKY: SM, Bill Uschan, KC4MIS—ASM: Tom Lykins, K4LID. SEC: Craig Still, KD4PWK. STM: John Farler, K4AVX. BM: Ernie Pridemore, KC4IVG. ACC: John Embry, K4AT. TC: Scotty Thompson, KI4AT. SGL: Ron Landrum, KM4DX. The devastation in Florida from killer tornadoes was the worst natural disaster since Hurricane Andrew. Is Kentucky ARES ready for this kind of disaster and magnitude? Recently, all Section Managers received a reminder from Mr Rick Palm concerning the lack of monthly reports that were being sent to the ARRL. So make sure that all DECs are sending their monthly reports to Craig Still, KD4PWK, The Cincinnati Hamfest was a good one. Some of us attended the ARRL forum and got to meet the new division director, Mr Joe Falcone and listen to his ideas. The ARRL has formally asked the FCC to change the way handicapped testing is done. Also, do not forget the Paducah Hamfest on June 13, 1998, and the Northern KY Hamfest on June 14, 1998. It is with regret that we report that Charlie Kendal, KC4VGF, became a SK on February 11, 1998. The FCC and the ARRL are finally going to try and clean up the ham bands. I feel that the use of foul, obscene, or profanity language has no business on ham radio. Sorry, but that's the way I feel. I do not think this is a problem in KY, and I hope it stays that way.

Net	*QNI*	*QTC*	*Sess*	*NM*
KRN	743	21	21	N4FP
MKPN	1390	31	28	K4LID
KTN	1207	44	27	K4LID
CARN	329	27	27	KB8WRU
TSTMN	682	23	28	WB8GWL
7ARES	56	4	4	WD4PBF

Tfc: K4AVX 49, KA4BCM 8, N4GD 14, W4OGP 51, KO4OL 7, K4YKI 6, WB5ZDU 15, WA4HLW 6.

MICHIGAN: SM: Dick Mondro, WA4FQT (wa4fqt@arrl.org)—ASM: Roger Edwards, WB8WJV (wb8wjv@centuryinter.net). ASM: John LaRock, K8XD (k8xd@voyager.net). SEC: Deborah Kirkbride, KA8YKK (ka8ykk@cris.com). STM: Dale Cryderman, KA9EIZ (dcryder222@juno.com). ACC: Mike Pearsall, N8MP (n8mp@zhills.net). OOC: Mark Drolias, N8IQX (mdrolias@gatecom.com). PIC: James (Erv) Bates, W8ERV (kb8tnq@voyager.net). SGL: Ed Hude, WA8QJE (edhude@juno.com). TC: Dave Smith, W8YZ(dsmith@smithassoc.com). VHF/UHF Net Manager: Paul Harmer, KB8ZDV. Section Newsletter Editor: Dave Colangelo, KB8RJI (dcolangelo@ameritech.net. Congratulations to the Michigan Net (QMN), our CW NTS affiliate, for transmittal to all of the National Weather Service Offices in the state, a total of 1563 precipitation measurement reports during 1997. These reports were both routine reports on daily nets as well as emergency reports during special net sessions to support events such as winter storm warnings and flood watches. Some dates to remember: The Michigan QSO Party is scheduled for April 18-19; Dayton Hamvention May 15-17 at the Hara Arena. Let's try to use Section 20 in the arena as a meeting place when you need to sit down and relax for a few minutes and would like to talk with someone from your home state. It is also a good opportunity to meet some new friends. Field Day is June 27-28 this year. I hope to hear a lot of Michigan activity on the bands. Check out your favorite club and see if you can help show some of the newer people how to have fun. Michigan Section news can be found at the following address: http://facops.albion.edu/grace/ Did you know that the Michigan State Police Emergency Management Division offers free courses dealing with emergency management? You must fill out an application and have it approved by your Emergency Management Director. Check with your RACES Officer, emergency management office or the State Police at (517) 333-5034 for a list of courses being offered. The Michigan Statewide Emergency frequency on HF is 3932 kHz. in the 75-meter band and the alternate frequency is 7232 kHz. in the 40-meter band. Please make a note of these frequencies. They will be used during statewide emergencies. 73, Dick, WA4FQT. Please support the following NTS Nets. February 1998 NTS Net Reports:

Net	*QNI*	*QTC*	*Sess*	*Net Mngr.*	*Freq.*	*Time*	*Day*
QMN	607	174	56	WB8SIW	3.663	6:30&10 PM	Daily
MACS	313	73	28	WB8RNQ	3.953	11 AM	Daily (1 PM Sun)
MITN	452	124	28	KA9EIZ	3.952	7 PM	Daily
UPN	1343	51	32	WA8DHB	3 921	5 PM	Daily (Noon Sun.)
GLETN	589	75	28	VE3SCY	3.932	9 PM	Daily
SEMTN	322	124	28	WI8K	145.330	10:15 PM	Daily
WSSBN	731	48	28	K8JRE	3.935	7 PM	Daily
ARAHN	61	1	4	KC8DAJ	145.130	8 PM	Wed
NCN	120	26	19	WD7G	146.940	7:30 PM	M-F
VHF	422	45	48	KB8ZDV	Various		

Tfc (Dec): N8FPN 191, AA8PI 119, KA9EIZ 112, WX8Y 97, KB8ZYY 85, WB8SIW 80, K8GXV 68, KB8HGM 64, N8TDE

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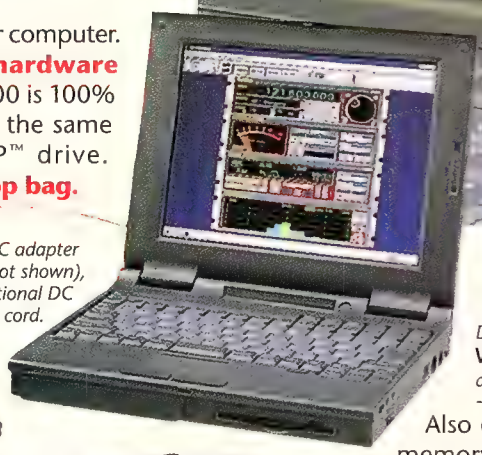

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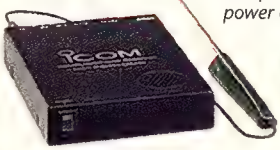

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55, KC8GMT 52, W8RNQ 50, K8XD 45, WA8DHB 41, WI8K 34, N8OSC 34, K8UPE 31, WA8JXG 27, K8ZJU 25, WR8F 24, K8JN 19, K3UWO 17, WB8YIQ 17, AA8SN 14, KC8GRP 12, WB8RFB 5, W8YZ 3.

OHIO: SM, David Kersten, N8AUH @W8IZ (see p.12), or kersten@irmg.com—ASM: John Haungs, WA8STX, 513-772-7378 or wa8stx@aol.com. ASM: Steve Wolf, W8IZ (Packet @W8IZ). SEC: Larry Solak, WD8MPV, 330-274-8240. STM: Jack Wagoner, WB8FSV, fsv@netwalk.com. ACC: Joanne Solak, KJ3O/8 330-274-8240. BM: John Schlueter, W8WYH, @W8BI. TC: John Fakan, KB8MU. SGL: Paul Krugh, N2NS, @W8COK. PIC: Beverly Priest, N8VZV, mapriest@erinet.com. OOC: Paul LaFollette, Jr. wb8ona@worldnet.att.net. You are reminded that a new 610 form (Sept 1997) took effect on Jan 1 and the old forms are no longer accepted when changing your address, new, or upgrade, etc. Anyone in Cincinnati area on the first Friday of the month, visit the Hamilton Co ARES meeting at Hamilton County Sheriff Training Ctr at 11021 Hamilton Ave, Talk-in 145.37, 8 PM. Let's get a Speakers Bureau together. If you have a good speaker at you club, let ACC Joanne, KJ3O, know. Your effort will help other clubs enjoy Amateur Radio as well as give your club new ideas from the list collected. So please contribute, thanks in advance. The Great Lakes Div Conv was a tribute to the memory of Rev Herbert Bates, K4PGF, ARES-AEC and a member of the committee who passed away suddenly while on vacation in Calif. It was great having the new Great Lakes Division Dir Joe Falcone, N8TI, in attendance as well as other ARRL officials. Maple Knoll Village Senior Retirement Center, Amateur Radio Club, W8MKV, Cinti is celebrating its first anniversary on the air. New officers, pres John Haungs, WA8STX; dir/trustee, Leonard Gardner, K8LB. The Senior Center provided a newly constructed facility that is operating on HF, VHF and Packet. ARRL club affiliation is underway. Hamfests coming up, Dayton HamVention May 15,16,17; Medina Co Hamfest June 7; Milford Hamfest June 20; OH-KY-IN ARS 1st Annual Hamfest, Cinti. July 25; GCARA Comm.Expo Cinti Sept. 20. Don't forget to send your Affiliated Club annual report form to ARRL for renewal.

Net	QNI	QTC	QTR	Sess	Time	Freq	Mgr.
BN(E)	158	83	271	28	1845	3.577	WD8KFN
BN(L)	193	68	281	28	2200	3.577	NY8V
BNR	129	44	1015	28	1800	3.605	W8LBQ
OSN	138	62	486	27	1810	3.708	WB8KQJ
OSSBN	1732	587	2116	84	1030,1615,1845	3.9725	KF8DO
OH SECTION ARES NET					1700 SUN	3.875	WD8MPV

Tfc: W8PBX 298, K8DNO 195, NS8C 184, W8PMJ 175, KD8HB 167, KA8HBN 148, N8TNV 138, KF8DO 107, WB8KFN 91, KC8FWU 70, N8FWA 68, KB8VYB 67, K8OUA 67, WB8HHZ 62, W8LBQ 55, N8RRV 51, WA8SSI 48, N8DD 48, K8JX 46, W8RG 42, WB8FSV 41, KI8O 40, K8WOQ 38, KB8TIA 36, WA8EYQ 36, K3RC 36, KB9GGA 34, W8JLW 33, N8YXL 33, N2NS 32, WB8KWD 32, N8VES 32, NY8V 31, KB8ROA 30, KC4IYD 30, KG9K 28, N8GOB 27, WB8KBW 26, N8CW 23, KC8DWM 23, KB8ESY 20, N8CX 20, W8BO 17, N8PAI 15, AA8XS 13, K8WC 10, KC8IBM 10, W8GHS 9, KC8HTP 9, KF8FE 9, KB8SIA 8, KB8SBK 7, KA8GOV 6, WD8MIO 6, KC8FUY 5, KB8XL 4, K8QIT 4, N8LSG 3.

HUDSON DIVISION

EASTERN NEW YORK: SM, Rob Leiden, KR2L (@WA2UMX)—STM: Pete Cecere, N2YJZ. SEC: Tony Pazzola, WB2BEJ. ACC: Shirley Dahlgren, N2SKP. SGL: Phil Bradway, KB2HQ. PIC and BM: Steve Anderman, WA3RKB. OOC: Hal Post, AK2E. TC: Elmer Sharp, WA2YSM. ASM: Tom Raffaelli, WB2NHC. ASM: Bob Chamberlain, N2KBC. ASM: Andrew Schmidt, N2FTR. ASM: Richard Sandell WK6R. Net Reports (February 1998) Check-ins (QNI)/Traffic handled (QTC+QSP): AES 41/6, CDN 392/152, ESS 401/218, HVN 505/323, NYP 300/727, NYPON 320/477, NYS/E 306/397, NYS/M 219/240, NYS/L 199/256, SDN 331/220 Our thanks to Net Managers N2RAD, WB2ZCM, WD2K, W2WSS, N2JBA, N2LTC, N2YJZ, WI2G, KA2GJV, W2YGW and N2TWN for the outstanding job they do for all of us. Section News: Congrats to N2YJZ, our new ENY STM, who achieved BPL again this month. Pete is also NYPON Net Manager and the coordinator of the QSY Society. We know that Rick, KF2YC, will continue to be a regular on the nets, as his new responsibilities at work permit, and he has our thanks for a job well done. W2UC is back on the air at Union College in Schenectady! Look for them every Tues eve. Our new ACC, Shirley (Skippy) Dahlgren, N2SKP, has been visiting clubs all over the section, from SARA in the North to WECA down South. Please write or e-mail her to let us know what your club's needs are and how we can help, at shirleyd@ computer.net. And Field Day is just around the corner! PSHR: N2YJZ 185, N2JBA 159, WB2ZCM 144, KC2AGL 81, KB2VXF 81, KC2AGL 76 Tfc: N2YJZ 548, N2JBA 81, WB2ZCM 42, KC2AGL 35, N2AWI 15, KB2VZF 10, KC2CRO 7.

NEW YORK CITY/LONG ISLAND: SM, Len Buonaiuto, KE2LE—ASM: KB2SCS. ASM: KD2YA. ACC: K2EJ. STM: WA2YOW. ASM: W2IK. PIC: Open. TC: WY2U. BM: KC2FD. SGL: Open. LGL: KA2RGI/Babylon. LGL: WA2KXE/Long Beach, WB2MGP/Staten Island. LGL: KB2TWO Queens. LGL: N2HH/Oyster Bay. OOC: Open. In keeping with the realignment of NLI for the best possible leadership, the above positions are open for new staff members. All DEC positions other than N2NFI are open as well and the ASM/SEC will be in charge until new staff are appointed. Many EC positions have been terminated as well and AECs will fill in until new members are appointed. KD2YA has list of terminations and will be in charge of all screening of new appointees. This action will enable the new ARRL members a chance to do their best for our section. New blood brings new ideas and new growth. Something this section needs very much. Come election time in October, the section will see many new changes that our new staff members have scheduled. No matter who the SM will be come Jan '99, the plans are in motion as we speak. All for the good, I am told. I wish all of them luck and look forward to the upcoming events. VE exam list as follows. VE sessions: Islip ARES, 1st Sat 9 AM, Islip Town Hall West 401 Main St. Islip, Addison Levi, KD2YA, 516-234-0589. Bears VE: ABC Bldg Cafeteria, 125 West End Ave at 66th St. Call Hotline 212-456-5224 for exact dates & times, Jerry Cudmore, K2JRC. Grumman ARC (W5YI) 2nd Tues 5 PM.

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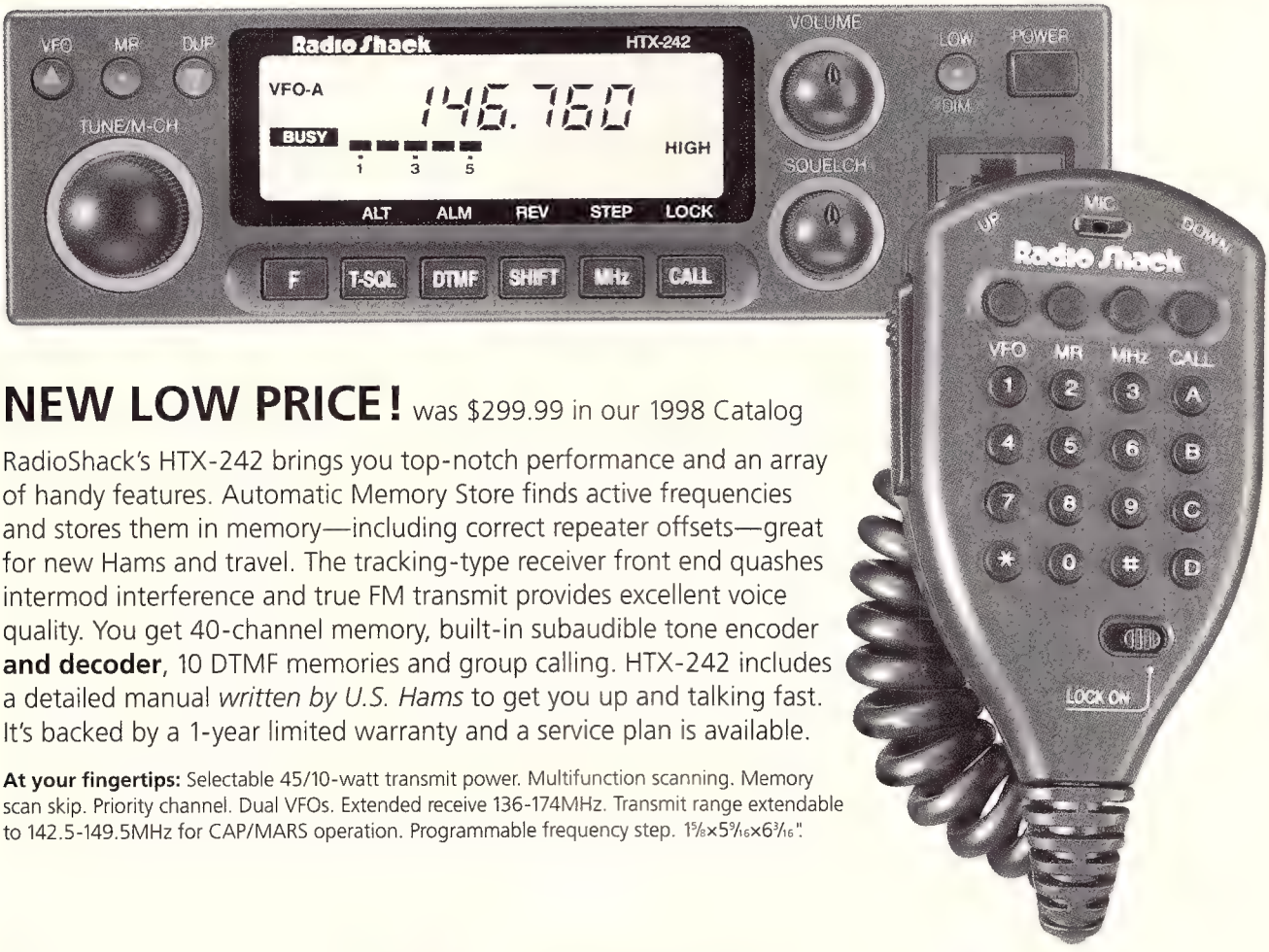

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P220VD	220-225	<1.8	15	0	DGFET	$29.95
P220VDA	220-225	<1.2	15	0	DGFET	$37.95
P220VDG	220-225	<0.5	20	+12	GaAsFET	$79.95
P432VD	420-450	<1.8	15	−20	Bipolar	$32.95
P432VDA	420-450	<1.1	17	−20	Bipolar	$49.95
P432VDG	420-450	<0.5	16	+12	GaAsFET	$79.95
Inline (rf switched)						
SP28VD	28-30	<1.2	15	0	DGFET	$59.95
SP50VD	50-54	<1.4	15	0	DGFET	$59.95
SP50VDG	50-54	<0.55	24	+12	GaAsFET	$109.95
SP144VD	144-148	<1.6	15	0	DGFET	$59.95
SP144VDA	144-148	<1.1	15	0	DGFET	$67.95
SP144VDG	144-148	<0.55	24	+12	GaAsFET	$109.95
SP220VD	220-225	<1.9	15	0	DGFET	$59.95
SP220VDA	220-225	<1.3	15	0	DGFET	$67.95
SP220VDG	220-225	<0.55	20	+12	GaAsFET	$109.95
SP432VD	420-450	<1.9	15	−20	Bipolar	$62.95
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NORTHERN NEW JERSEY: SM, Roy H. Edwards, Sr., AB2RE, AB2RE@AB2RE-4), e-mail: AB2RE@arrl.org—ASM: KB2CMF. ASM: OOC KB2JSG. ASM: N2WZB. NNJ Webmaster. ACC: N3RB. Volunteer Counsel/N2IOB. BM: N2LXM. STM: WB2FTX. PIC: WX2DEB. There are two very important cabinet positions in the NNJ Section that are currently vacant. The first being the appointment of Northern New Jersey Section Emergency Coordinator. The other a result of the Affiliated Club Coordinator becoming seriously ill suddenly. As the result of Paul Toth's resignation and subsequent relocation, the section emergency coordinator's position is presently vacant. I am trying to fill the vacancy in order to continue with the many projects that have been initiated with Paul's generous help and expertise. I am hoping to be able to assist the DECs and the ECs in enhancing the section's emergency response abilities. While the position is vacant I ask that all DEC s feel free to include me in any issues that they deem needed. If anyone feels that they are qualified and would consider the position or perhaps know of a possible candidate for SEC please contact me at AB2RE@ARRL.org The Affiliated Club Coordinator's position, although not vacant, is in need of someone who can fill the position while Rich is convalescing. I have asked that in Rich's absence, Deb McKay, WX2DEB, in addition to performing as current PIC, will fill in as acting affiliated club coordinator. She will be working to rebuild the affiliated club data base, assist with special service club applications, and will be working to organize the Field Day activities of the "Section Cabinet Caravan." To that end Deb has requested that all NNJ Section clubs forward the name and address of your organization, a contact name, phone number and e-mail address to her. Additionally, in the tradition of NNJ section leadership, an annual Field Day tour is being planned. If you would like us to stop by, please forward the name of your group, a contact person with phone number and e-mail address and the location that you will be operating from to Deb who will be working closely with the rest of the cabinet in an effort to cover the section during the Field Day weekend. If e-mailing Deb on issues having to do with the above, or other ACC topics, please use the title of "Affiliated Club" in the subject of your e-mail and forward them to WX2DEB@QSL.NET. Placing Affiliated Club in the subject line will assist Deb in sorting through the e-mails and extract the ones that deal with the above important issues. Thank you for your continued support during this time of flux in the NNJ Section leadership. OOC, KB2JSG, asks that anyone wishing to become a member of the Amateur Aux, or having the need to get in touch with him please do so at MAGJSG@juno.com February 1998 STM report for NNJ:

Net	*Mgr*	*Time*	*Freq*	*Sess*	*QNI*	*QTC*
NJM	WA2OPY	1000	3695	28	194	90
NJPN	W2CC	1800	3950	32	225	35
NJSN	AA2HJ	1830	3715	28	113	2
NJN/E	AG2R	1900	3695	28	245	84
NJN/L	AG2R	2200	3695	28	123	23
CJTN	T-N2POP	2000	147.120	28	312	49
NJVN/E	W2PTZ	1930	146.895	28	335	35
NJVN/L	N2OPJ	2230	146.490	28	241	40

2RN HF Winlink received 143 NTS, forwarded 143 NTS, originated 4 NTS. Tfc/PSHR: N2XJ 146/133, W2MTO 144/111, N2OPJ 79/166, K2VX 63/77, N2GJ 27/137, N2QAE 26/35, N2RPI 24/152, WB2CZW 20/106, W2CC 18/78, KB2VVB 13/159, N2OFB 7/58, N2TTT 4/32.

MIDWEST DIVISION

IOWA: SM, Jim Lasley, NØJL @ KEØBX—ASM: NØLDD. SEC: NAØR. ACC: NØIJP @ KEØBX. BM: KØIIR @ WØCXX. SGL: KØKD. TC: WØDIA. If I figured this ok, the DSM Hamfest just ended... but...Hey! It's time for Hamboree XX. I have my reservations complete. I see plans for hamfest and Field Day coming along nicely. Sorry to note the passing of WØOWG. I know he is missed. On a brighter note, WØEJ is now on the P&Z commission for Linn County. Sounds like you made an impression, Wade! The TSARC is active with fund raisers to help equip the comm van. Keep goin' fellas don't stop now! CAARC notes several illnesses in January. I'm sure there have been many in the last few months due to this crazy weather. 50s in February and below 0 in March! I am sure enjoying the snow in mid March! Dubuque has its hamfest scheduled for August 30. I keep trying to get there. Maybe this year. OARC had a program on satellite communications in March. They are looking for a RTTY program using TNCs for a future month. MPARC is goin' to e-mail for part of the newsletter list. If your club newsletter is produced that way, you can put me on the list for the e-mail version. Lots of groups are having (or participating in) storm spotter training classes. I guess that it is spring again! NIARC is looking for pictures of members to scan into the newsletter. Nice idea. ARCS is doing theirs in COLOR! Gee... I use a color printer at work and it is nice. Friends that have them generally indicate they are expensive to feed. It is time for storm spotting, hamfests, and FD. Let me know where you are having yours and a talk-in freq. I might show up! Newsletters were received from DMRAA, IIARC, TSARC, CAARC, OARC, MPARC, NIARA, SARA, FMARC, NIARC, ARCS. Traffic: WØSS 70, NØJL 37. (Jan) NRØE 23.

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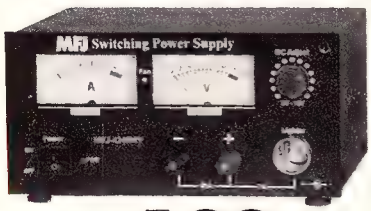

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KWM2/A.....Complete tube kit, no 6146W's: $100
32S-1F .....Complete tube kit w/6146's: $149
32S-3F .....Complete tube kit w/6146's: $149
51S-1 .....Complete tube kit: $115
75S-1 .....Complete tube kit: $85
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KANSAS: SM, Orlan Q. Cook, W0OYH, ASM/ACC/OCC Robert Summers, K0BXF, SEC: Joseph Plankinton WD0DMV, SGL, Marshall Reese, AA0GL. Hi gang, BPL congrats to Elden, N0KJ, 949 and Bill, AA0OM 705 points. Thanks guys for a job well done. AA5PA, Jay, CSTN mgr tells me the 40-meter band is very good at 12:30 PM net time on 7253. Thanks Jay, your net report reflects that and more. If you hold a Technician license I need your help. Send me your e-mail addresses. If you would like to serve your community by ham radio, Let me know. Unfilled jobs await you. Reading through my home BBS, WV0T, I noticed a nice letter "Kansas Packet" from NX0R. If you can be of help let him know. NX0R@NX0R.# NCKS.KS.USA. No AM or jimtanis@nckcn.com. Support Kansas packet as a group rather than groups. Your resources will go further. Unite! Reports for Jan Nets: sessions/QNI/QTC, KSBN 31/1068/82 KPN 22/248/22, KMWN 31/646/527, KWN 31/863/628, CSTN 27/ 2181/99, QKS 59/281/100, QKS-SS 4/8/1. LAN: Parson ARC 3/66/0, Coffeyville ARC 4/77/0, IND ARC 5/99/0 via N0LIE. SEC report QTC/28 with AA0IQ, AC0QE N0JJO, WD0DDG, W0QGS, N0LJR, WD0DMV. TEN report 253 msgs 62 sessions KS stns 77% with KB0DTI, AC0OE, AA0FO, KX0I, K0PY, NB0Z, WB0ZEN E WB0ZNY, Dave TEN mgr. Packet BBS reports W1AW Bulletins/Personal/NTS, AA0HJ, K0JJV 33/253/1, N0OBM 37/358/0, NX0R 33/373/1. Ks Section stn tfc: N0KJ 949, AA0OYH 191 175. WB0ZNY 104 K0QY 76 KX0I 38 NB0Z 38 KB0DTI 18.

MISSOURI: SM, Roger Volk, K0GOB—ACC: Keith, WE0G. ASM: Karen, N0TDW. ASM: Tom, KI0JO. OOC, Mike, N0QBF. PIC: Dennis, AA0A. SGL: Ern, KD0UD. SEC: Fred, WA0US; STM: Tom, KI0JO. TC: Mac, K4CHS. We hams have not done an adequate job of documenting the assistance we provide, FREE, to the general public. The big stories like earthquakes, floods and tornadoes get mentioned, but the day to day assistance goes undocumented. I glean some of the local items from club newsletters and document them here. Commercial interests are continually challenging our use of the limited frequency spectrum. It has become increasingly clear that the best, and possibly the only way to respond to such threats is to have a long list of "what have you done for me lately" stories on hand. To this end, the League is requesting that each SM encourage their members to report all public assistance activities to the appropriate section level official. At the end of this column you will find a list of nets, and their activity, as reported by the NMs to the STM. I know that there are many more nets operating regularly in the section. Encourage the NMs to send in a report. What about all of the hard work done each month by the OOs? Please send a monthly note to the OOC so that all of the little activities can be combined into one big list. The same for the ECs and DECs. I don't care if it is one month behind, just send something. With the many nets and free e-mail addresses, it doesn't cost anything except a little time. The time you spend now might be the difference of saving a band or set of frequencies in the future. Sorry for the soapbox session, but this collection of information is very important to the future enjoyment of the hobby. Nets: MOTRAN 28/673/140 K0IPM; STLRPTR 4/135/5 K0WEX; PAULREVERE 4/460/0 N0IWA; HAMBUTCHERS 20/973/249 WL7YM; MON1&2 56/215/66 W0OTF; ROLLABB 28/389/5 NA0V; KCABARC 4/146/4 KA0SSE; WAARCI 4/109/0 KB8DQB; WJACKCOARES 4/34/0 K0UAA; 1880GOB 28/196/29 WL7YM; SWMOWARN 4/150/6 N0UAM; CARL 3/25/1 KC0MV; AUDRAINARC 4/35/3 WB0SEN; HARC 4/210/0 N0YLF; QCWA35 4/96/0 K0YML. Tfc: KI0JO 898; W0OTF 140; KE0K 113.

NEBRASKA: SM, Bill McCollum, KE0XQ—ASMs: W0KVM, N0MT, WB0ULH, WY0F & WB0YWO. It is with deep regret to inform you that John Ferrel, W0YDV, became a Silent Key on March 5. John was a life member of the ARRL, life member of the AK-SAR-BEN ARC and a member of QCWA. Due to the March blizzard, I was not able to attend the Nebraska State Convention held in Norfolk. I am pleased to announce the following appointment: KA0DBK, EC for Buffalo County and KC0BHJ NM of the Saunders County ARES Net. There are several openings for ECs, if you are interested, contact KF0FO, the SEC. I attended the Ashland ARC meeting on Feb 22. There were 11 in attendance and plans are going forward for the club to be affiliated with the ARRL. WB0TUE has served as an OO for the last couple of years. His wife, Peggy, N0UEA, has accepted a new job in Missouri. I want to wish Carl and Peggy the best. I have already made a recommendation to the MO SM to keep Carl on as an OO. Tfc: K0PTK 106, W0AP 28, WY0F 16, KE0XQ 8, WW0R 4, KA0DOC 2, K0RRL 2, W0EXK 2, WC0O 2, K0OAL 2, AA0KQ 2. PSHR: KA0DBK 70, KB0YTM 20.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Betsey Doane, K1EIC, K1EIC@arrl.org—ASMs: KZ1Z, NK1J, N1API, K1STM. ACC: WA1CBW. BM: KD1YV. OOC: W1FAI. PIC: W1FXQ. SEC: NI1U. SGL: K1AH. STM: K1HEJ. TC: KA1KJZ. Traffic handlers are planning their annual dinner for April 25 in Plainville. This event really gives you a wonderful opportunity to talk about the art of traffic handling and meet those with whom you work each day on the nets. Getting together is a wonderful way to learn about the hobby so please make every effort to attend. If interested, contact assistant STM Anne, K1STM. Lenny, KD1OY, spoke at the last meeting of the Nutmeg Chapter of the QCWA on his experiences teaching children about Amateur Radio through participation in the SAREX program. His talk was fascinating and certainly motivated those present to think about how they could work with young people to introduce them to this wonderful hobby. Congrats to the Newington Amateur Radio League on becoming renewed once again as an ARRL Special Service Club. Jay, N4GAA, spoke about packet radio at the March meeting of the Shorepoint ARC. Marty, K1CVF, spoke about radio in the '20s to the Valley ARA. He is really knowledgeable about antique radio and enjoys coming to clubs when he has the time. The Nachaug ARC is holding a ham fest in Vernon on May 24 so mark your calendars now! Don't forget to make reservations for the Division Convention in Boxboro, MA, held this year on August 28-30. Contact me if you need further info. Many thanks to all those participating in "Response 98," a drill involving FEMA, State OEM, American Red Cross and local towns to be held during the week of April 20-24. Working with other agencies is very important, as it not only gives us the chance to sharpen our own skills but allows us the opportu-

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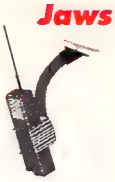

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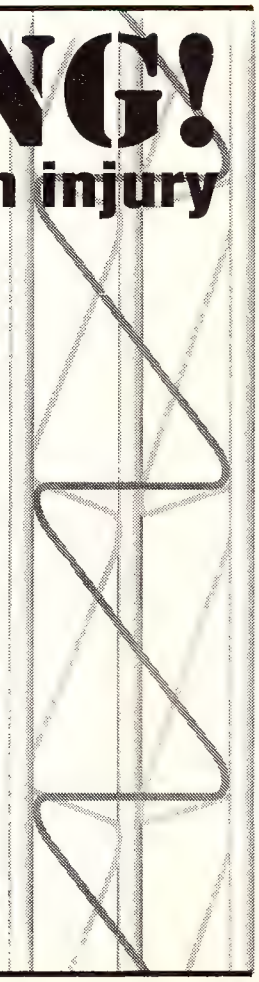

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nity to understand the different procedures used by others in an emergency. This understanding is critical to our success in disaster situations. Again, many thanks to all involved! Net sess/QNI/QTC/NM: WESCON 28/369/180/KA1GWE; RASON E/L 56/383/82/WA4QXT; NVTN 28/217/111/K1STM; CPN 28/242/94/N1DIO; CN 21/81/19/N1AEH. BEARS of Manchester 25/279/415/NM1K. Tfc: NM1K 1964, KA1VEC 533, KA1GWE 333, WA4QXT 241, K1TM 232, N1VXP 125, K1HEJ 125, N1YVV 71, KE1AI 70, N1MIE 12, W1GPS 11.

EASTERN MASSACHUSETTS: SM, Larry Ober, W1MW—ASMs: WA1IDA, KB1BCF, N1GTB, N1UGA, N1SGL. ACC: Open. BM: N1IST. OOC: K1LJN. PIC: N1PBA. SEC: W3EVE: K3HI. STM: WA1TBY. TC: W3EVE. EMA ARRL: voice: 978 263-2498. Packet bulletins: ARRL@EMABBS. E-mail: w1mw@arrl.org. e-mail list:ema-arrl@netcom.com. Web: ttp://www.qsl.net/ema-arrl. The Boston ARC will be moving their meetings to the Boston Back Bay Salvation Army Headquarters starting in April. They will also be holding license classes for six weeks beginning March 23 at the Pierce School in Brookline. The Framingham ARA plans to hold Field Day once again at Gerard's Turkey Farm. They are also planning another of their "License In A Weekend" courses March 27-29. The Cape Ann ARA is planning their Annual Spring Dinner for April 4 in Essex. The Barnstable ARC is planning to hold their 5th Annual Auction on May 2 at the American Legion Hall in Barnstable. In addition they plan to hold the 5th Annual Cape Cod Tailgate Swapfest June 13 in Dennis. The Southeastern Massachusetts ARA will be holding licensing classes from March 15 to June 7 in South Dartmouth. They also report much interest in their ARRL Headquarters field trip scheduled for May 9. The Wellesley ARS will be holding their Flea Market July 18 at Babson College. They are running coaching sessions for anyone interested in obtaining or upgrading a license the 4th Saturday of each month at the club station in Medfield. The Falmouth ARA is continuing a concerted effort to have the town's zoning by-laws amended to reasonably accommodate amateur towers. Hams in other towns who are fighting the good fight might want to take a serious look at FARA's efforts to date. It could serve as a good model for group action. The Norwood ARC has been running a licensing course through the local adult education program. Their February meeting was a dinner meeting. The Quannapowitt RA continues to hold VE sessions in conjunction with Melrose ARES the third Saturday of each month in Melrose. Many clubs have been setting up Web sites and improving their existing Web presence. We'll try to get the links from the EMA section Web site updated as part of an overall redo. The Section Web Renewal project is well behind schedule since this project has fallen on your Section Manager who has too many tasks on his plate. Despite time limitations it will eventually get done. However, the Section is in need of a Webmaster who can accomplish this more efficiently and stay on top of current changes. I would like to hear from anyone interested in helping. We are also still seeking an Affiliated Club Coordinator (ACC). This is an excellent opportunity for anyone who would like to become involved in section leadership. 73 de W1MW. Tfc: WA1TBY 486, WB2EAG 259, WA1FNM 232, NZ1D 217, N1LAH 113, K1UGM 110, N1LKJ 107, KA1WCD 85, K1BZD 81, WA1LPM 68, N1AJJ 47, N1SGL 44, K1SEC 42, K8SH 35, N1ZFF 33, N1VUX 31, N1IST 27, KD1LE 27, KB1EB 26, N1XQC 22, NG1A 21, KA1VAX 14, N1TPU 10, KA1BBU 4, N1VUK 4.

MAINE: SM, Michelle Mann, W1GU—ASMs: WA1YNZ & KA1TKS. STM: NX1A. BM: W1JTH. TC: NS1Z. SGL: W1AO. ACC: KA1RFD. OOC: KA1WRC. PIC: KD1OW. SEC: N1KGS. Asst Dirs W1KX. KA1TKS, K1NIT. Please welcome new SEC Max Soucia, N1KGS, and give him your help and support as he takes on this important and demanding job. Max can be contacted at 423 Route 7, Dover-Foxcroft, ME 04426. His phone is 564-8943. Please note that I have a new e-mail address: mmann@ctel.net.The Andy Hamfest/Maine State Convention brought out a big crowd in Lewiston. The seminars were well attended and lots of people were at the hamfest. Winterfest in Chelsea also helped to cure a lot of cabin fever and sure looked like a success! As many of you already know, I decided it was time for someone else to be Maine's Section Manager, and I did not seek another term. Bill Woodhead, N1KAT, was unopposed in his bid for the job, and therefore will soon become your new ARRL representative. His term would officially begin July 1, however, we will be making the change a little early, on April 1. Bill has been president of the Androscoggin club for many years and is also now president of the Maine QCWA chapter. I know he will do a great job as SM. This will be my last section news column. It's been almost 6 years, and I want to thank everyone — cabinet members, field organization volunteers, and all the hams of Maine — for their help and support during my time as Section Manager. You've all been great! February traffic: NX1A 149, W1KX 135, W1CE 85, KA2ZKM 79, W1JTH 75, AF1L 40, W1QU 37, N1WL 36, K1UNQ 28, NR1W 28, N1JBD 26, WA1YNZ 25, W1JX 13, KA1RFD 7 — 73 de Michelle.

NEW HAMPSHIRE: SM, Al Shuman, N1FIK—ASMs: WB1ASL, W1NH, N3CLZ, N1FIL, N1KIM. TC: WA1HOG. SEC: WB1ASL. STM: WA1JVV. ACC: NA1E. SGL: K1KM. BM: KH6GR. OOC: W1GTA. PIC: KA1GOZ. February brought the passing of Johnny Johnson, W1JY. He had served as the Technical Coordinator to three NH Section Managers for more than12 years and recently retired from that position in June 1997. It seems that far too many of our stock are becoming SKs and not enough are joining the ranks. New hams in NH have trickled to a precious few. In fact in most months of 1997, new hams numbered in the single digits. I was recently contacted by a school in southern NH asking for help in running Novice/Tech classes for teachers and students. The call went out with no response. The New Hampshire Web site has a new address and a new look. We are now at www.nh.arrl.org. Come visit us! The city of Manchester has begun to review its tower ordinance as has many other municipalities of late. May 9-10 brings us the Hosstrraders flea market in Rochester, NH. I, again, will be manning the ARRL booth with a variety of ARRL publications that you just can't do without. Hope to see you there. 73, Al. Net mgr/sess/QNI/QTC/Time: GSFM 28/340/84/742; GSPN K1ZO/32/171/53/323; TSEN N1VFM/4/71/7-; VTNH WA1JVV 28/164/91/404. Tfc: W1FYR 1760, K1TQY 953, W1PEX 918, KA1OTN 129, WA1JVV 123, N1NH 91, WB1GXM 86, N1CPX 83, W1ALE 46, AE1T 28, K1ZO 28, AA1QD 27, KH6GR 14.

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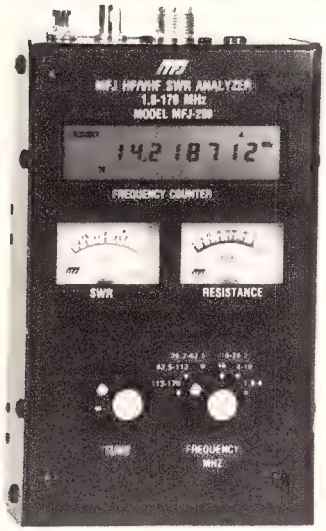

MFJ-259 **$239.95** If you work with antennas, MFJ's revolutionary new *SWR Analyzer*™ is the best investment you'll ever make! Now you can diagnose a wide range of antenna problems instantly with one easy-to-use instrument.

What the MFJ-259 Does

The MFJ-259 gives you a complete picture of your antenna's performance anywhere between 1.8 and 170 MHz -- you can even check SWR outside the ham bands without violating FCC rules. Set the bandswitch and tune the dial--just like your transceiver. SWR is displayed instantly!

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Does 2:1 SWR mean 25 ohms or 100 ohms? *The new MFJ-259 tells you at a glance!*

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Here's What You Can Do . . .

Find your antenna's true resonant frequency from the shack.

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Tune critical HF mobile antennas in seconds -- without subjecting your transceiver to high SWR.

Measure your antenna's 2:1 SWR bandwidth on a single band, or analyze multiband performance over the entire spectrum from1.8 to 170 MHz!

Measure inductance, capacitance, resonant frequency of tuned circuits, transmission line velocity factor/impedance/loss.Test RF chokes, transformers, baluns.

Adjust your tuner for a perfect 1:1 match without creating QRM.

And this is only the beginning! The MFJ-259 is really *four* test instruments in one: an accurate RF signal generator, a high resolution 170 MHz frequency counter, *RF Resistance Meter*™ and an *SWR Analyzer*™.

Free Manual

MFJ comprehensive 18 page instruction manual is packed with useful applications -- all explained in simple language you can understand! **For** free manual write or call MFJ.

Take It Anywhere

The MFJ-259 is fully portable, powered internally by 8 AA batteries or 110 VAC with MFJ-1312B, $12.95. It's in a rugged all metal cabinet that's a compact 4x2½x6¾ inches. Take it to remote sites, up towers, on DX-peditions -- anywhere your antennas are located.

For rough service, pick up a convenient **MFJ-29B**, $24.95, padded carrying pouch to keep your MFJ-259 close at hand and looking like new.

How Good is the MFJ-259?

MFJ SWR Analyzers™ work so good, many antenna manufacturers use them in their lab and on the production line -- saving thousands of dollars in instrumentation costs! Professional installers and technicians use them worldwide.

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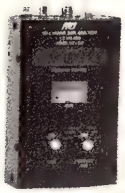
With the MFJ-259, you get full 1.8 to 170 MHz coverage, simple operation, instantaneous readings, a high accuracy frequency counter and MFJ's exclusive *RF Resistance Meter*™-- all for a low $239.95.

1.8-170 MHz *SWR Analyzers*™



MFJ-249 **$219.95** **MFJ-249** *HF/VHF SWR Analyzer*™. Same as MFJ-259 but less RF resistance meter. Includes 10-digit LCD frequency counter, *full* 1.8-170 MHz coverage and smooth vernier tuning.

MFJ-209 **$109.95** **MFJ-209** *HF/VHF SWR Analyzer*™ is same as MFJ-259 without LCD frequency counter and RF resistance meter. Has jack for external frequency counter, smooth vernier tuning.

Carrying Pouch with Window

MFJ-29B **$24.95** **Tote** your MFJ-259 /249/209 *SWR Analyzer*™ anywhere with this custom Carrying Pouch. Made with a special foam-filled fabric, it cushions blows, deflects scrapes, and protects knobs, meters and displays from harm.

Clear protective frequency display and window cutouts for knobs let you use it without taking it out of pouch. Fully adjustable webbed fabric carrying strap has snap hooks on both ends. Wear around waist or over shoulder.

Keep your analyzer safe and looking new! **MFJ-29**, $19.95, no window or cutouts.

Dip Meter Adapter

MFJ-66 **$19.95** **Plug** a dip meter coupling coil into your *MFJ SWR Analyzer*™ and turn it into a sensitive and accurate bandswitched dip meter.

With a dip meter you'll save time and take the guesswork out of winding coils, measuring inductance and capacitance, measuring velocity factor and electrical lengths of coax. Determine resonant frequency of tuned circuits and measure Q of coils. Set of two coils cover 1.8-170 MHz depending on your *MFJ SWR Analyzer*™.

440 MHz *SWR Analyzer*™

MFJ-219 **$99.95** **Read** SWR of any antenna 420 to 450 MHz -- just plug coax of your antenna into SO-239 connector, set frequency and read SWR. Uses microwave integrated circuits and microstrip technology. Jack for external frequency counter. 7½x2½x2¼ in.

MFJ-219N, $99.95, sames as MFJ-219 but with "N" connector.

MFJ-219 uses 9 volt battery or 110 VAC with MFJ-1312B, $12.95.

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Measure signal strength over 60dB range - Check and set FM deviation - Measure antenna gain, beamwidth, front-to-back ratio, sidelobes, feedline loss in dB - Analyze audio quality with scope

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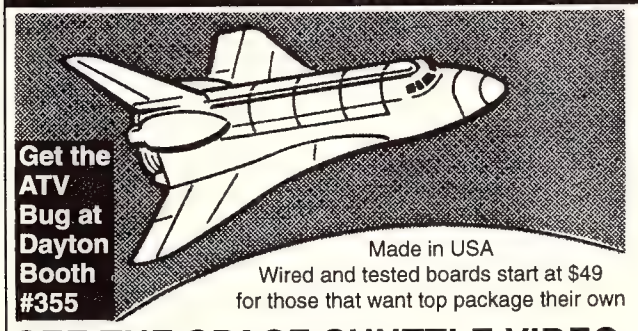

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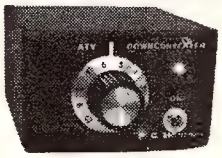

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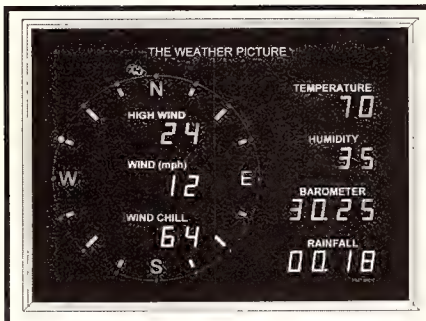

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RHODE ISLAND: SM Rick Fairweather, K1KYI, e-mail k1kyi@juno.com— Don't forget the '76 Auction and Flea Market in Forestdale on May 16. I look forward to seeing many of you there. Some Pawtuxet Valley ARC members helped out at the West Warwick St. Patrick's Day parade in March. Washington County ARA and Fidelity ARC are co-sponsoring a flea market and VE session on April 25 in the Exeter/West Greenwich area on Route 3. Fidelity's quarterly newsletters have new editors, KA1UMU and AA1QJ...good luck. The FRC club net is on Sunday nights at 1930 local time on the WF1A 145.13 repeater and their slow speed CW net is on Monday's at 2030 local on 28.156 MHz. Newport County RC will provide comms for Newport Lions Club's soapbox derby at the end of May. Ocean State ARG provided comms for the RI Whitewater Canoe Race in Burrillville at the end of March. There are two SKYWARN seminars coming soon. The first is in Hope Valley Tuesday night at 7:00 PM at the Chariho Middle School which is aimed at folks in South County. The next opportunity is in early June in nearby Uxbridge, MA, at the high school for those up in the northern part of the state. Tfc: WA1CSO 92, KA1JXH 42. PSHR: WA1CSO 137, KA1JXH 88.

VERMONT: SM, Bernie Capron, N1NDN—The emergency plan that I have been talking about for the last few months is finally printed and ready for distribution. We will have training sessions based on the emergency plan around the state starting in late March or early April and continue on through the year. This is an excellent opportunity to receive training to be prepared for an emergency. You do not have to be a member of ARES or RACES to participate in these training sessions. The more people that are trained the better we look in the event of a disaster such as the ice storm in January. Many thanks to Joe Armstrong, KA1YLN for initiating the idea of the emergency plan and carrying out the details. I'm very excited about this since it will make ham radio in Vermont really shine! I am also happy to announce that I will be your section manger for the next two years. I was unopposed in the nominations. If you haven't seen our Web site please visit it at WWW.VT.ARRL.ORG. Sessions/Checkins/Traffic Vermont/New Hampshire Net (VTNH) 28/164/91 Green Mountain Net 24/777/23. Tri-State FM Emergency Net (Keene) 4/71/7. Public Service Honor Roll Stations: KT1Q 144; N1DHT 119. Traffic: KT1Q 645*; N1DHT 211; KA1YLN 11 * BPL. Vermont had 100% representation on 1RN/Cycle 2.

WESTERN MASSACHUSETTS: SM, William C. Voedisch, W1UD, *w1ud@juno.com.* ASM: N1LZC. ASM (digital): KD1SM. STM: W1SJV. SEC: K1VSG. OOC: N1NYD. After reviewing all the club newsletters, I have come to the conclusion that Field Day should be well attended. Generators are being taken to the repair shop for the annual tune up. Chair persons have been selected. Selective pieces of equipment has been tagged for operation. Some clubs are going "dutch" for food while others are furnishing all participants at least one meal. This should be a productive year. I hope that all clubs have encouraged all licensed members to participate. There should be a station set up so every class of licensee can operate. Last year, I went to four sites and despite the fact that I covered more than 200 miles, I managed to get on the air from home and work about 400 stations. I plan on doing the same thing this year, but to sites I did not cover last year. The HCRA Club, under the outstanding chairmanship of Irv, W6IS, is planning a trip to the Cushcraft plant. That trip should be most interesting. Charlie, K1II, has done a remarkable job with his emergency area. Great documentation! Tfc: KD1SM 25, W1SJY 205, N1ISB 16, W1ZPB 41, AA1TE 110, N1KXL 33, W1UD 191.

NORTHWESTERN DIVISION

EASTERN WASHINGTON: SM, Kyle Pugh, KA7CSP. SEC: WA5ZAY. STM: W7GB. OOC: KB7HDX. SGL: WB7UEU. TC: N7TOF. ACC: KA2LCC. Documentation of Public Service work, and ARES and NTC activity, is important to address spectrum, RFI, and other issues challenging the amateur service. Section appointees, be sure to get your reports in each month, your information is needed. In February your SM worked several stations on 6 M SSB via aurora skip, 'twas interesting. Sorry to report Paul Heritage, W7AFZ, Colville; and Robert Morris, WA7TFQ, Goldendale, are Silent Keys. The Yakima Hamfest for this year has been cancelled. I had a good time at the Puyallup hamfest which was very well attended, but the demise of ham radio dealers was very apparent; you can count on one hand the number of existing radio stores in the Northwest. 73, KA7CSP. Tfc: W7GB 288, K7GXZ 238, K7BFL 106, KA7EKL 93, W7UVP 40. PSHR: W7GB 138, K7GXZ 135, W7UVP 97. NETS: WARTS: QNI 2676, Tfc 202; NOON NET: QNI 7504, Tfc 269; WSN: QNI 708, Tfc 325. Tfc: W7GB 288, K7GXZ 238, K7BFL 106, KA7EKL 93, W7UVP 40.

IDAHO: SM, Mike Langrell, AA7VR—OOC: N7HGV. SEC: KI7EP. STM: W7GHT. We had our District 3 ARES/RACES meeting last month at the Canyon County EOC. Bob Weber is the new Canyon County Emergency Coordinator there and he greeted us with a warm welcome. We had a chance to make ourselves known to him and demonstrate our capabilities. I believe he is sold on the idea that we would be a mission critical resource to him if a disaster occurred. At the Governor's Conference on Emergency Management, I had an opportunity to meet Bill Hoek, N7OGR, the new Boise County Emergency Manager. We look forward to having our meetings in other counties, so stay tuned to the nets for their locations. Tim Rynearson, N7UBO, replaced Brian Mahaffy, N6UGP, as the District 3 Emergency Coordinator. 73, Mike, AA7VR. Tfc: W7GHT 234, WB7VYH 110, KB7GZU 63, and N7MPS 17. PSHR: W7GHT 123, WB7VYH 110, N7MPS 63. Net SESS/QNI/QTC/Mgr: FARM 28/2287/29/N7OGR; NWTN 28/1777/84/KC7RNT; IDACD 20/525/20/K7UBC; IMN 28/281/184/WB7VYH.

MONTANA: SM, Darrell Thomas, N7KOR—February was a very busy month for amateurs in the Montana Section providing public service communications. The major event was the amateur support of the annual Race to the Sky Sled Dog Race. Hams from Helena, Great Falls, Lincoln, French Creek, Missoula, Lakeside and Kalispell donated their time and equipment to provide 24-hour communications support to the race from February 14-19. They were set up at Race Headquarters, the start line, four check-points and the finish line of this 350-mile race across the mountains of

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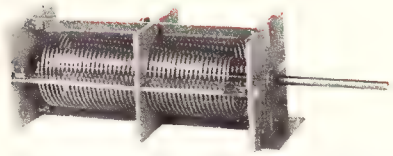

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MFJ's exclusive *Self-Resonance Killer*™ keeps potentially damaging self-resonances away from your operating frequency.

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Covers 6 Meters thru 160 Meters

The MFJ-969 covers *all* frequencies from 6 Meters through 160 Meters, *including the "magic band"* -- the widest matching range of any full featured antenna tuner.

Match any Antenna

You can match dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave receiving antennas -- nearly *any* antenna. You can use coax cable or balanced feedlines. Has heavy duty 4:1 balun.

Lighted Cross-Needle Meter

MFJ's lighted Cross-Needle Meter shows you SWR, forward and reflected power *simultaneously*. It reads *true peak* forward power and average power on 300 watt or 30 watt ranges.

Meter light has ON/OFF switch and requires 12 VDC or 110 VAC with optional MFJ-1312B, $12.95.

8 Position Antenna Switch

MFJ's 8 position antenna switch lets you select two coax fed antennas, random wire/ balanced line or built-in dummy load for use through your MFJ-969 or direct to your rig.

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MFJ's *QRM-Free PreTune*™ lets you pre-tune your MFJ-969 off-the-air into a built-in dummy load without causing QRM.

Pre-tuning into a dummy load makes tuning your actual antenna faster and easier.

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The MFJ-969 has a *full size* non-inductive 50 Ohm dummy load.

You'll find it handy for tuning, testing and repairing your rig, setting power level, adjusting your mic gain and more.

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Two *massive* 250 pf transmitting variable capacitors with extra wide (0.27 inch) spaced stator plates can handle 6000 volts and amps of RF current for arc-free operation.

Lighted Cross-Needle meter lets you read SWR, forward, reflected power *simultaneously*. Read peak and average power in two ranges.

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MFJ's heavy duty current balun has two giant 2½ inch toroid cores with Teflon® wire connected to ceramic feedthru insulators. You can use balanced lines without core saturation or voltage breakdown.

A *full-size* 300 watt non-inductive 50 ohm dummy load is built-in.

Has convenient flip-stand. 10¾x4½x15 inches. Backed by MFJ's famous one year *No Matter What*™ unconditional warranty.

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western Montana. Race officials had some very nice things to say about Amateur Radio and those volunteers who helped during the presentation at the awards banquet. Congratulations for a job well done. In other public service efforts the hams in the Wolfpoint area were put on standby to provide communications at emergency shelters for passengers from an AMTRAK train which was halted by a bomb threat and in Livingston hams provided communications and assistance to Park County officials during the search for a missing person. The interest in Amateur Radio continues strong in the Lincoln area. Hams there are in the process of forming a club and will be installing a repeater as soon as snow conditions allow access to the mountaintop they have selected. We look forward to having their club affiliate with ARRL in the future. Net/QNI/QTC/NM MSN 130/1 W7OW; MTN 1927/66 N7AIK; IMN 281/182 WB7VYH. Tfc: KA7YYR 401. PSHR: KA7YYR 115.

OREGON: SM, Randy Stimson, KZ7T—ASM: W7FBP. ASM: KF7KE. ASM: K7GOK. ASM: N7QQU. STM: W7VSE. SEC: WB7NML. PIO: KC7YN. SGL: KA7KSK. ACC: AA7OA. STC: N7HMV. OOC: NB7J. Rickreall being the first hamfair of the year has some influence on how great it seems to be. After a few days I can think back on how well it is organized with all of the commercial exhibitors and the flea market tables. They have a great turnout every year and it seems to get better every year. So keep up the good work and everyone mark their calendar for the third Saturday in February 1999. A reminder about the SEA-PAC Convention on May 30 and 31 1998. With all of the manufacturers there so you can touch the new gear and talk to the representatives. A special note about the SEA-PAC Friday, May 29th 1998 seminar. Ed Hare, W1RFI (That is his real call), will be talking about the FCC RF Exposure Regulations. If you want to attend you must contact ARRL and there is limited space. It goes from 1:00 PM until 6:00 PM. There is a swap net going on that I just heard about. It is every Saturday evening at 7:00 PM until everyone has a say. It will usually last about an hour. It is called the Ham Shopping Club. The net control is Carl, N7UXP. Give him a listen on 145.29. It is not a directed net, but if you have questions about your equipment or any related problems, they try to resolve them. There is always Field Day in June and you know how I feel about it as to where you should hold the event so I will refrain from saying it again this year. We have new officers in the Willamette Valley DX Club. They are President Vince, K7REG, VP John, W7WX, Secretary Bill, AA7KF, and Treasurer Mike, K7NT. Traffic: N7DRP 386, W7VSE 154, W7WAT 146, WA7EES 139, W7ODG 130, K6AGD 112, KA7AID 71, K7NLM 52, and N7UOF 35.

WESTERN WASHINGTON: SM, Harry Lewis, W7JWJ—ASM: W7QGP. SEC: N7NVP. STM: KD7ME. Western Washington Official Observer Coordinator Merle McLaughlin, W7DNY, has picked up his travel bags with the first stop Hawaii and as a consequence has resigned as OOC. Merle has provided long and dedicated service to amateurs everywhere. We owe to him a debt of thanks. George, K7BDU, has again qualified for BPL with a total of 808. This man does not sleep! Report from SEC Ed Bruette is as follows: The Clark Co Red Cross team under the leadership of Bill Smith, W7SNY, completed their assessment of communications capabilities and problems from all of the anticipated Red Cross evacuation shelters throughout the entire county. EC, Ken Weber, K7CLL, recently received a certificate and letter of appreciation from the Red Cross for the work of Clark Co radio amateurs. During the Clark County ARC annual awards banquet Asst EC/RO Robert Goodale, K7YFJ, received a special honor for his hard work on behalf of the club. K7CLL also received a special honor for his ARES leadership. And best of all, Mark Gaunt, KG7CX, team leader coordinator, received a major award for all of the public and club service he has performed. Well done to all of those very deserving folks in Clark Co, including those not presented awards. Behind every awardee there is a support network without which none of us would get much done. We must not forget them. The Boeing BEARS ARC participated in an open house at the 18-237 cafeteria in early spring. The feature attraction was Amateur Radio. Booths contained displays of APRS, TCP/IP, Direction Finding, QRP, HF, VHF, UHF, Radio Kit Building, Radio Control, Search and Rescue, ARES, and ARRL. Individual tfc reports from KD7ME: N7AJ 69, K7BDU 808, K7CLL 6, W7LG 18, KG7LS 34, KD7ME 233, K7MQF 158, W7NWP 21, N7PIP 4, KA7PMD 20, W7RFM 160, K7SUQ 19, W7TVA 234, K7YB 2, N7YSS 56, W7ZIW 288.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASMs: W6ZF, WB3FCV. SEC: N4OGL. DECs: WA6TGF/Alameda County, KO6JR/Contra Costa County, WA7IND/Napa County, K6USW/Solano County, N6UOW/Training, KE6HCI/Administration, KE6NVU/Finance, W6CPO/Technical Services. STM: K6APW. OOC: W6NKF. TS: KF6NY. The Alameda County Emgy Svcs (ACES) Net is held Tuesdays at 8 PM on 147.240, 444.200 (107.2), 147.120, 224.740, 441.125 (100.0) & 145.43 (100.0). All are linked for the net, and those interested in Emgy Comms are invited to check in. Check out the EB WWW Page at http://www.pdarrl.org/ebsec/. Webmaster is KB6MP. I'm saddened to report the passing of two active section members. Tom Dutcher, K6CCY, and Jim Van Gundy, AA6VG. Last month's column contained an error! LARK congratulated upgrades KE6HDQ & KQ6DI on their upgrades. Sorry for the mistake. Oakland RACES Radio Officer, K6JAT, is participating in a FEMA project to institute a Safety and Future Empowerment (SAFE) program. EBARC welcomes new members KF6OBQ & KF6LGE; and congratulates KE6WZN on becoming the newest member of their VE team. VVRC's *The Repeater* contained an excellent article on net protocol by Pres KD6JSB. SBARA ARES members were called upon by Fremont PD to monitor potential mudslide areas. Responding were KE6YKG, KD6RMI, WU6A, KE6OGM, N6UOW, KD6PJE, KE6UXM, & KB6UOK; with KF6NVS, KF6GAH, KF6ACN, AA6SL, W6QWK & KF6GAG scheduled for later shifts, which were not required. LARK mourns the loss of KB6DXR. Feb Tfc: W6DOB 755, WB6UZX 11. PSHR: W6DOB. BPL: W6DOB. Tfc nets: NCN1/3630/7 PM; NCN2-SLOW SESSION/3705/9 PM; NCN-VHF/145.21/7:30 PM; RN6/3655/7:45 pm & 9:30 PM; PAN/3651/7052/8:30 PM.

NEVADA: SM, Bob Davis, K7IY. SEC: N7JEH. TC: NW7O. ACC: N7FFP. STM/SGL: N7CPP. PIC: WW7E. Hello to all section members, Springtime is approaching and hopefully

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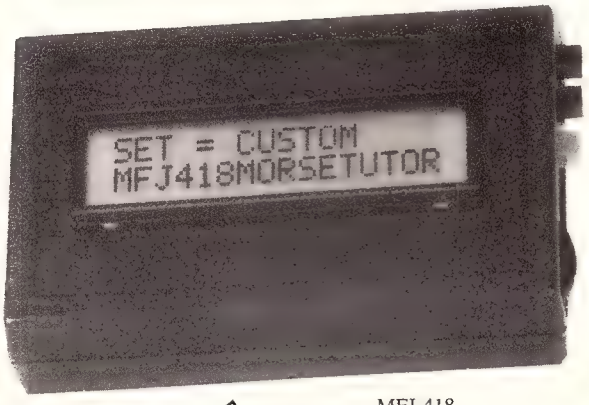

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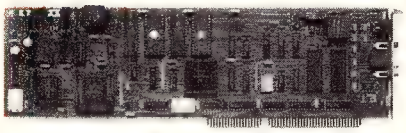

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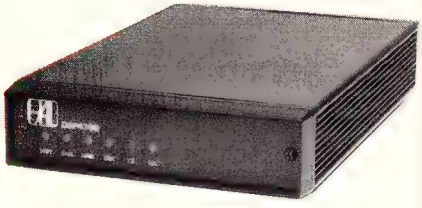

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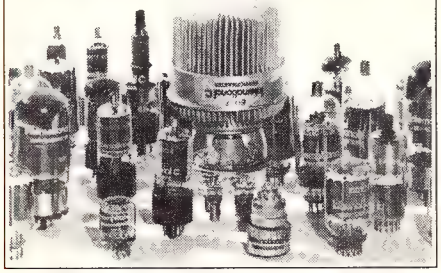

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we are experiencing the last of the winter weather. I hear that many of the clubs have extensive repairs and improvements to make at their repeater sites, and with the snow totals we have in the north, it may be awhile. FARS is sponsoring the Nevada QSO Party on May 9 and 10. Contact Jim Frye, NW7O, at 702-456-5396 for more information. Make plans to attend the annual Reno Hamfest. This year is a combined effort between SNARS and WADG, and will be held August 1. Contact John Peterson, KJ7EE, at 702-853-8452 for more information. It will be held at the Alamo Truck Plaza, on Interstate 80. Please welcome Squeak Porray, AD7K, as the newest ARRL section appointee as Technical Specialist in the Las Vegas area. Ron, KG7OR would like to remind all members in the Elko area, to please check in on the Wednesday night ARES net on 147.21 at 7:30 PM. SIERA is reporting that the recently acquired new meeting place has been a huge success. Congrats to Melissa, KK7AA, on her recent upgrade to Amateur Extra. Please remember to check in to the weekly HF Section ARES Net on Saturday mornings at 8:30 AM on 3965. Thanks and 73 ! Bob, K7IY. Tfc: N7CPP 11, K7OK 4.

PACIFIC: SM, Dean Manley, KH6B—SEC: Dennis Carvalho, KH7H. ASM: Harry Nishiyama, KH6FKG. ASM: Lee Wical, KH6BZF. SGL: Ron Phillips, AH6HN. OOC: Chuck Burch, AH6IN. TC: Kenny Bell, KH6AFQ. Koolau ARC has terminated their VEC program under Joe, KH6BFZ, after many years giving no-fee exams. Koolau is considering the ARRL-VE program. Mike, AH7R, and Walt, AH6OZ, had a QRP outing at Hoomaluhia Gardens Oahu, February 14-15. HI QRP Club members NH6WW and WH6CQA are building Pixie 2 QRP transceivers for 80 meters. Ben, WM3C, is now signing NH7D from Hilo. Please consider participating in local nets:

Hawaii Afternoon Net	0200 UT	7088
Pacific Interisland Net	0800 UT	14315
Friendly Net	1900 UT	7285
EARC Net – Mon	1930w	146.88
EARC Net – Fri	1930w	146.80
Hawaii ARES - 1st Thu	0500 UT	3905
HI QCWA - 1st Mon	0100 UT	7088

Mahalo, 73 and Aloha.

SACRAMENTO VALLEY: SM, Jettie Hill, W6RFF—John Lewis, KD6GSD, resigned as EC Sacto Cty due to work load. Thanks for your past help John. Hills RC's annual Swap Meet is May 31 at Bella Vista High School on Madison Ave, in Fair Oaks. Have you checked out the Sacramento Valley Section Web Page? This column can be seen 2 months earlier on the Web Page. Silent Keys: Rosie Peden, KK6GC, Robert Vogt, KN6MC, Ed Gould, W6ZUZ. KC7HKU and YXL went to Nagano Japan to see their son Mike compete on the US Snowboard team. North Calif. ACS Emergency Response Institute to be held May 2-3 in Sacramento. Call 408-778-7265 or e-mail larton@garlic.com for info. Yuba-Sutter ARC now meeting at Red Cross Bldg in Yuba City on 2nd Wed They also provided communications for "Bike Around the Buttes" ride. KF6T, ex-W1FEA, gave talk to Sierra Foothills ARC on Contesting. KO6TH continues to chase satellites and discuss it with SFARC members. Many clubs preparing for Field Day. Yolo ARS still hoping to get the Davis Explorit! Science Center as a meeting place. AC6DQ resigned as VIP Coordinator due to knee problems. Mother Lode DXCC has been issued K6A for use during Amador Cty. Fair July 30 thru Aug 2 and as part of the celebration of the discovery of gold in Calif. A new club has been affiliated with the ARRL in Sacramento. It is called "Friends & Amateur Radio Communications Enthusiasts (FARCE). Robert Fitzgerald is Director of Programs. For info call 485-8816 or e-mail to dcdrizle@ts1.teale.ca.gov. Section Net 1st Sunday/mo on 146.085 MHz at 8 PM, open to all for info, questions or comments. 73. Tfc: KE6NTZ 92, WA6WJZ 85, KF6DJZ 24.

SAN FRANCISCO: SM, John Wallack, W6TLK, Packet W6TLK@KJ6FY—ASMs: N6KM, KE6EAQ. OOC: KD6HQ. PIC: N6BWS. SEC: WB6TMS. TC: N1AL. It is with sadness that I report the following Silent Keys: WB6LWQ and WD6DLU from Lake County. I am especially sad to announce the passing of Jim McCauley, AB6EU, of Glen Ellen. Jim was a dedicated traffic handler in NTS and has been STM in this section for the past 6 years. He was an active VE, instructor and Elmer for many new hams. He was a member of the Valley of the Moon ARC. News from Humboldt County is that four radio clubs (Humboldt ARC, Redwood ARC, Southern Humboldt ARC and Far West Repeater Assoc) are considering forming an umbrella group to pursue 501c3 tax exempt status. Hope you are making plans for operating in Field Day on the weekend of June 27-28. This is the most popular ham radio operating event each year and for good reason. It is a great time to be with friends enjoying our favorite hobby in the great outdoors. Field Day is intended to represent emergency operating conditions and show the flexibility and resourcefulness of Amateur Radio to people in our community. Make the best of this opportunity.

SAN JOAQUIN VALLEY: SM, Donald W. Costello, W7WN—ASM: Mike Siegel, KI6PR. ASM Technical: John Lee, K6YK. SEC: Larry DeWitt, WB6GJT. OOC: Victor Magana, AA6AH. February was a very wet time in Stanislaus and Merced Counties. Volunteers from the ARES units in Stanislaus and Merced Counties came to the aid of our communities through service to the American Red Cross offering emergency communications from Red Cross HQs to shelters. The following is a list of volunteers who deserve to be recognized for their efforts. Thank you all for your volunteerism. Chuck Brashear, KC6YCH; EC Stanislaus County; Kent LeBarts, K6IN; EC Merced County, Nan Hartman, KF6BOZ; Ed Hanna, Jr., KF6FIR; Jim Call, KE6HVB ; Marion Riley, KC6YDA; Ernie Rader, W5NH; Bob Kimball, KC6TVE; Lloyd Reedy, KD6JWE and our Section EC; Larry DeWitt, WB6GJT. Kent LeBarts, K6IN, is the new EC for Merced County and is looking for volunteers for the Merced County ARES unit. In the works is an agreement with the Nevada SM, Robert Davis, K7IY, to help with mutual aid for ARES communications for the Mammoth area of the section on the eastern slope of the Sierras. In the event of a volcanic eruption or other disaster ARES units will respond from the southern part of the SJV Section and from Nevada as well. This agreement is being made to best

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Only MFJ gives you tunable and programmable "brick wall" DSP filters

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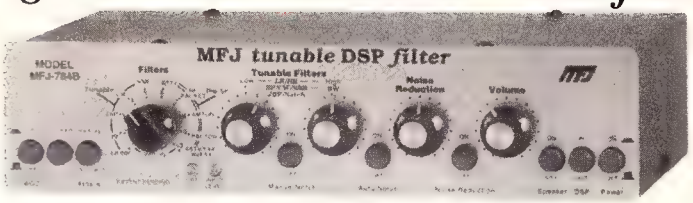

MFJ's *tunable* super DSP filter automatically eliminates heterodynes, reduces noise and interference *simultaneously* on SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX, weak signal VHF, EME, satellite.

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MFJ's *automatic notch* filter searches for and eliminates *multiple* heterodynes.

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Narrow band signals like CW and RTTY jump out of QRM when you switch in MFJ's exclusive *tunable* FIR bandpass filters.

You can tune the center frequency from 300 to 3400 Hz, and vary the bandwidth from 30 Hz to 2100 Hz -- from super-tight CW filters to wide razor-sharp Data filters.

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You can tune the lower cutoff frequency 200 to 2200 Hz and the upper cutoff frequency 1400 to 3400 Hz. This lets you create *custom* filters for Voice, Data and other modes.

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Noise reduction works in all filter modes and on all random noise -- white noise, static, impulse, ignition noise, power line noise, hiss.

The LMS algorithm gives you up to 20 dB of noise reduction. Noise reduction is adjustable to prevent signal distortion.

15 *pre-set* filters -- factory set or you custom program

You can select from 15 *pre-set* filters. Use for SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any mode.

If you don't like our pre-set filters, you can program your own -- *an MFJ exclusive!* Save center frequency/bandwidth, lowpass/highpass cutoffs, auto/manual notch, noise reduction -- all filter settings -- in 10 *programmable* filters.

Plus more . . .

A push-button bypasses your filter -- lets you hear the *entire* unfiltered signal.

2½ watt amplifier, volume control, input level control, speaker jack, PTT sense line, line level output. 9½x2½x6 inches.

Plugs between your transceiver or receiver and external speaker or headphones. Use 12 VDC or 110 VAC with MFJ-1315, $14.95. Cable Pack, MFJ-5184, $7.95, includes receiver cable, DC cable, 2 open-end TNC cables.

New Features

MFJ's exclusive tunable *Spotting Tone*™ -- accurately tunes even the narrowest CW filter.

MFJ's exclusive *Adaptive Tuning*™ -- tuning rate automatically becomes finer as you narrow bandwidth -- makes narrow filters easy-to-use.

MFJ's exclusive *FilterTalk*™ -- sends precise filter settings in Morse code.

Has automatic notch with *variable* aggressiveness, new quieter 2½ watt audio amplifier, new speaker switch keeps phones always active.

Manual and automatic notch can be used together. Noise reduction, automatic notch and tunable manual notch can be used when a custom filter you saved in memory is selected.

You get an accurate easy-to-use input level indicator, improved manual notch in the CW mode, adjustable line level output, more Mark-Space frequencies and baud rates for data filters and auto- matic bypass during transmit for monitoring CW sidetone, voice or data by sensing the PTT line.

Firmware Upgrade

For MFJ-784, order **MFJ-55, $29.95.** Gives you most features of the MFJ-784B.

NEW! 60 dB Null *wipes out* noise and interference

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Wipe out noise and interference *before* it gets into your receiver with a 60 dB null!

Eliminate all types of noise-- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes . . .

It's *more effective* than a noise blanker because interference much stronger than your desired signal can be completely removed without affecting your signal.

It works on *all modes* -- SSB, AM, CW, FM -- and frequencies from BCB to lower VHF.

You can null out strong QRM on top of weak rare DX and then work him! You can null out a strong local ham or AM broadcast station to prevent your receiver from overloading.

Use the MFJ-1026 as an *adjustable phasing network*. You can combine two antennas to give you various directional patterns. You can null out a strong interfering signal or peak a weak signal at a push of a button.

Easy-to-use! Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive *Constant Amplitude Phase Control*™ makes nulling easy.

RF sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312B, $12.95. 6½x1½x6¼ inches.

MFJ-1025, $139.95. Like MFJ-1026 less built-in active antenna, use external antenna.

Add DSP to *any* Multimode

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Add "brick wall" DSP filtering to *any* TNC or multi-mode data controller.

Copy signals buried in noise and QRM.

Under severe QRM, DSP greatly improves copy of Packet, AMTOR, PACTOR, TOR, Clover, RTTY, SSTV, WeFAX, FAX, W -- nearly any digital mode. Automatic gain ntrol, ON/OFF/Bypass switch. Plugs between ansceiver and multi-mode. Uses 10-16 VDC or 10 VAC with MFJ-1312B, $12.95. 4½x2½x5in.

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Plug a MFJ-780 "brick wall" DSP filter into your MFJ-1278/B multi-mode and you won't believe your eyes when you see solid copy from signals completely buried in QRM! MFJ-1278/B *automatically* selects the correct DSP filter for Packet, AMTOR, Pactor, RTTY, ASCII, FAX, Color SSTV, Navtex or CW.

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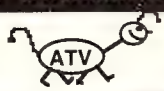

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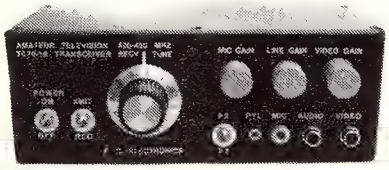

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Show the shack, home video tapes, zoom in and describe projects, show computer graphics and programs, repeat SSTV or even Space Shuttle Video and audio if you have a TVRO. Go portable or mobile, do public service events, RACES, AREC, CAP, even transmit the local radio club meetings to those hams that can't make it.

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The automatic fast/slow squelch locks on to weak signals and eliminates squelch tails on strong signals.

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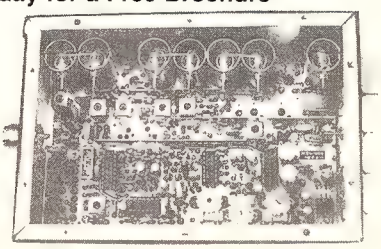

serve the interests of the public in the event of such a disaster and is in the best tradition of Amateur Radio. I would like to extend my thanks to Bob Davis, K7IY, for his cooperation in this endeavor.

ROANOKE DIVISION

NORTH CAROLINA: SM, W. Reed Whitten, AB4W—ASMs: AB4S, KE4ML, KC4ACE. SEC: K4MPJ. ASECs: WA4MOK, N4UCO, KD4RYE. STM: K4IWW. ASTM: W4EAT. TC: K4ITL. SGL: KI4AN. OOC: W4ZRA. PIC: KN4AQ. ACC: W4CC. BM: KD4YTU. Section Web Site *http://www.ncarrl.org* Our second ARRL Leadership Seminar, held at the Charlotte Hamfest, was well received and most interesting. Speakers from the North and South Carolina ARRL Field Organization shared information about resources available for radio clubs and ARES organizations. Congratulations to the Forsyth ARC which received an ARRL Special Service Club certificate at the seminar. Congratulations also to Lynn Gahagen, AF4CD, the newly elected Virginia SM. We met March 4 and discussed the coordination of emergency communications and Amateur Auxiliary activities. Both Lynn and I will participate in a panel discussion with Rick Palm, K1CE at the National Hurricane Conference in Norfolk on April 7. I also met with the other Section Managers in the Roanoke Division in at the hamfest. Cooperation within the ARRL Field Organization is essential. Disasters don't recognize state lines. K4MPJ, our Section Emergency Coordinator, reports that many DECs and ECs have now completed the ARRL EC Training & Certification Course. He also reminds us to participate in the Tar Heel Emergency Net, our HF ARES net (3923 kHz at 7:30 PM eastern) and our SKYWARN nets. Only report the weather information requested by the net control. Although NWS occasionally asks for observations from a specific area, they are usually only interested in reports that meet their severe weather criteria, which the net control will repeat frequently. Please follow instructions and DO NOT make unnecessary transmissions. Thanks for the support for the section staff and me in the recent SM election. DurHamfest, May 23; Concord Hamfest, May 31; Charlotte ARC Hamfest, Jun 6; Winston-Salem Hamfest, Jun 13. Tfc: W4EAT 485, KI4YV 423, AB4E 235, K4AIF 210, K4IWW 171, K4CWZ 139, W4IRE 77, AC4DV 74, KE4JHJ 55, KD4ITI 48, W2CS 48, W3HL 48, AB4W 47, KE4AHC 45, K4DDY 44, KB4FWL 39, KF4NJP 34, KE4JWL 27, AE4EC 25, NT4K 24, N4YXU 22, AF4NC 16, K4ROK 16, KF4RXR 16, WA4SRD 13, WD4MRD 11, KA4KTU 10, N5XUJ 10, AA4YW 8, W4DYW 8, N4WZH 7, WB4SGA 7, KE4YMA 6, KF4PAK 5, KQ4SN 5, KR4ZJ 5, KT4CD 5, N2JLE 5, KB4USN 2, KB8VCZ 1, WA4ZWC 1.

SOUTH CAROLINA: SM, Les Shattuck, K4NK— Don't forget the Upstate Hamfest to be held on May 9th at the Anderson fair grounds. This year will host an ARRL forum and A very large Southeastern QRP forum. Guest speakers will be coming from North Carolina's Knightlite QRP group, the No Georgia QRP club and the Grand Strand QRP society. Lots of extra door prizes too. While at the hamfest please stop at the South Carolina SSB net and say hello. Also we will have a table of our ARRL freebees. I have arranged a table for the QCWA gang too. I have information that our SEC Gerald Hensley, K8AFP, will have a meeting for all those interested in emergency communications. Topics will be on ARES, RACES, and MARS emergency communications. This is an open meeting so all are welcome. It will be held at the Red Cross building on Bull St in Columbia on June 6th.Please contact Gerald for further details. I have enjoyed speaking to three clubs in recent months. The Laurens Club, Anderson Club and the Sugar Creek Club. I had a great time at each meeting and hope to return. PSHR for Feb 1998: KA4UIV 132, AE4UB 128, KT4SJ 108, KA4LRM 82, W4JF 80, AE4UB 361, KT4SJ 214, K4QP 79, KA4UIV 71, W4DRF 62, W4JF 48, KT4FP 40, WA4UGD 30, WD4BUH 20, K4GDL 19, W4CQB 15, W0RXR 12, WB4WTY 8, KQ4SY 5, W4VHZ 4, K8DHZ 2.

VIRGINIA: SM, Lynn Gahagan, AF4CD—ASM Terry McCrickard, W4TLM. SEC: Frank Mackey, K4EC. ASEC: Bob Lewis, N4SCK. ASEC: Tony Amato, KR4UQ. STM: Geri Sweeney, N4GHI. ACC Vacant BM Vacant. SGL Frank Brooks, W4UMC. TC Richard Graziano, W3ERD. OOC, Tony Amato KR4UQ. PIC Gary Martin W2MG. I would like to take this opportunity to thank everyone who supported me in the election for Section Manager. Also many thanks to Chris Wright for letting me serve 16 months as ASM. Good luck Chris and I wish you well. I have already tweaked the section leadership, which will enhance the way we function to better serve you, the members. First, let me introduce Terry McCrickard, W4TLM, your new ASM. Terry is located in Franklin Co. in Area B and will keep an eye on the western part of the state, Districts 11 through 15. Please contact Terry if you live in this area. He will have direct contact with me at all times. Your new PIC is Martin Gary, W2MG. Martin lives in the Richmond area. Contact Martin for any news you may have. KR4UQ is our new OOC and has held an OO appointment in this important program and will reorganize and add OOs section-wide. The number one goal for my first year in office is to make sure everyone knows how the section is supposed to operate. This will be done by putting together programs like ARES/RACES had in Chester and Tidewater. This and other programs are to be presented throughout the state. K4EC advises the next ARES/RACES session will be in the Roanoke area, although the date and exact location have not been established. Plans are to have ARES/RACES workshops section-wide for the membership to have input on what they would like to see take place in their section. ARES/RACES District 9 has a new DEC, Cindy Rohrer, AE4EF. I know she will do an excellent job in Tidewater. The entire section owes Bob Ham, KK4IY a big thanks for spearheading SB-480 through the Virginia legislature, along with many others that assisted him. Bob, and those who worked with him appear to have a great tower bill that follows PRB-1. At the time this article is being submitted, the bill has been worked-out and is going to the full House and Senate to be voted on. Great job Bob! More on this and much more next month. Finally, VA ARES/RACES has a home page that incorporates a section page. Our plan is to have links to section appointees, expanded section news, and announcements. The URL is http://www.aresva.org. Click on the Virginia Section link and you're there! 73 de AF4CD. Tfc: KQ4ET 721, K4DOR 616, K4MTX 287, KR4MU 243, N4ABM

10 Bands -- 1 MFJ Antenna!

Full size performance . . . No ground or radials

Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna
Separate full size radiators . . . End loading . . . Elevated top feed . . . Low Radiation Angle . . . Very wide bandwidth . . . Highest performance no ground vertical ever . . .

Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters -- with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

Full size performance gives you high efficiency for more power radiated. The result? Stronger signals and more Q-5 QSOs.

Full size performance also gives you exceptionally wide bandwidths so you can use more of your hard earned frequencies.

Full size performance is achieved by using separate full size radiators for 2 through 20 Meters and highly efficient end loading for 30, 40 and 75 /80 Meters.

Get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, and low SWR. Handles 1500 watts PEP SSB.

MFJ's unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

It's easy to tune because adjusting one band has minimum effect on the resonant frequency of other bands.

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- on small lots, backyards, apartments, condos, roof tops, tower mounts.

MFJ-1798
$269.95

Separate *Full Size* Radiators

***Separate** full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

The active radiator works as a stub to decouple everything beyond it. *In phase* antenna current flows in all parallel radiators.

This forms a very large equivalent radiator and gives you incredible bandwidths.

These radiator stubs provide automatic bandswitching -- there is absolutely *no loss* due to loading coils or traps.

End Loading

On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique *Frequency Adaptive L-Network*™ provides automatic impedance matching for lowest SWR on these low bands.

Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

No Ground or Radials Needed

You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation.

You can mount it from ground level to roof top and get awesome performance.

No Feedline Radiation to Waste Power

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Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is used in the main structure.

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MFJ *Super Hi-Q Loop*™

MFJ-1786
$299.95

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It's ideal where space is limited -- apartments, small lots, mobile homes, attics, motor homes.

Enjoy both DX and local contacts when you mount it vertically. You get *both* low angle radiation for excellent DX *and* high angle radiation for local close-in contacts. Handles 150 watts.

Super easy-to-use! Only MFJ-1786 *Super* Remote Control has *Auto Band Selection*™. It auto-tunes to your desired band, then beeps to let you know. No control cable is needed.

Fast/slow tune push buttons and built-in two range *Cross-Needle* SWR/Wattmeter lets you quickly tune to your exact frequency.

All *welded* construction, no mechanical joints, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter *round* radiator -- not a lossy thin flat-strip -- gives you highest possible efficiency.

Each plate in MFJ's *superb* tuning capacitor is welded for low loss and *polished* to prevent high voltage arcing. It's welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches and a continuous *no-step* DC motor for *smooth precision* tuning.

A heavy duty 1/8 inch thick ABS plastic housing with ultraviolet inhibitors protects it.

MFJ-1782 $269.95. Same as MFJ-1786 but remote control has only fast/slow tune buttons.

NEW! **MFJ-1788**, $359.95. Same as MFJ-1786 but covers ***40 Meter through 15 Meter*** continuous. Includes super remote control.

Super 80/40M Vertical

MFJ-1792
$159.95

Designed as a *high performance* antenna for 80 and 40 Meters, the MFJ-1792 features a *full size* quarter wave radiator for 40 Meters - - that's a full 33 feet of ruthless radiating power.

End loading -- the most efficient form of loading -- is used for 80 Meters. It's accomplished by a virtually lossless 4½ foot capacitance hat and a high-Q coil wound with Teflon® wire on a *low-loss* fiberglass form.

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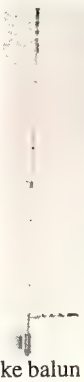

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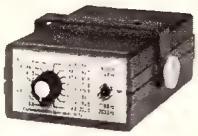

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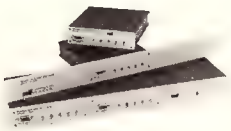

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228, KE4AZL 180, WD4MIS 129, K4YVX 122, W4JLS 109, WB4ZNB 107, WB4KSG 104, K4PRR 103, KE4PAP 100, W4UQ 73, KE4NYY 63, KF4LBD 59, N4GHI 55, KE4YXW 54, WA4DOX 48, KF4FXT 44, W4HU 42, W4TZC 41, KN4OH 40, KN4US 30, N3PDK 29, KØIBS 29, WB4KIT 24, AE4ER 20, KS4IG 14, WB4UHC 10, W4TY 9, KE4HFX 9, KF4HJW 8, K4IX 7, W4HDW 6, KE4KET 6, N4BTO 4, KD4GID 2, K4JM 2, KF4DUS 2, N4FNT 2, W4IN 2.

WEST VIRGINIA: SM, O.N. (Olie) Rinehart, WD8V—STM: WD8DLY. SEC: K8QEW. ASEC: KA8ZOO. SGL: K8BS. TCC: K8LG. OOC: N8OYY. ACC: WD8MKS. DIGITAL: K8MHR, APRS: W8XF. While in Charlotte for the Hamfest and talking to John Kanode it was brought vividly to my attention that we have a great deal of change in staff at the FCC. Four of the five commissioners are brand new to their appointments. The chairman of this independent Government Agency whose wireless division controls Amateur Radio is William E. Kennard. The other four commissioners are Susan Ness, Harold Furchtgott-Roth, Michael Powell and Gloria Tristani. Susan Ness is the only incumbent. Details, phone and fax numbers are available at www.fcc.gov. Looks like details on DXCC 2000 will be fully available soon. Need details? Our Roanoke Director John (N4MM) has it ! Very pleased and interested in the news of UHF/VHF traffic nets in the Roanoke Division (WV, VA, NC, SC). We can learn and profit from their experiences. Bottom line is this level of traffic nets really generates traffic, train operators and peak the interest of a lot of hams to get involved and provide public services. Let's strive to keep WV in the forefront on this facet of Amateur Radio. Please put the new Form FSD-157 (1-98) to work now ! 73. PSHR: WD8V 263, WD8DHC 138, W8IMX 138, KA8WNO 118, W8JWX 118. Tfc: KA8WNO 267, WD8DHC 117, WD8V 194, W8IMX 76, W8FZP 34, K8QEW 48, WL7CON 13. WVFN Daily 18:00 E 3.865, 1478/114/10:23 N8OYY; WVMDN Daily 11:45 E 7.235, 868/32/07:59 WD8DHC; WVNE Daily 19:00 3.567, 249/83/05:47 W8IMX; WVNL Daily 22:00 E 3.567 158/47/05:33 W8IMX; ARES/RACES 45 NETS/33. K8QEW; DIGITAL 48/182 K8MHR

ROCKY MOUNTAIN DIVISION

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS & N5ART. SEC: K6YEJ. STM: N7IOM. NMs WA5UNO & WA5UWY. TC: W8GY. ACC: N5ART. New Mexico Roadrunner Net meets daily on 3939 @ 0100 UTC and handled 154 msgs with 1122 checkins. New Mexico Breakfast Club meets daily, 3939 @ 6:30 AM and handled 180 msgs with 1075 checkins. Yucca 2-mtr Net 78/18 handled 15 msgs with 554 checkins. Caravan Club 2-mtr Net, 66/06 handled 8 msgs with 78 checkins. SCAT Net, 66/06 handled 25 msgs with 680 checkins. Four Corners Net handled 18 msgs with 285 checkins. GARS Net handled 1 msgs with 29 checkins. QCWA Net handled 3 msgs 21 checkins. Rusty's Raiders, 94/96, with 132 msgs and 702 checkins. Valencia County Net handled 2 msgs with 41 checkins. The internet is becoming more prevalent in Amateur Radio. The Div Dirs, the SMs and many others can now be reached by e-mail and many of the NM clubs have home pages on the World Wide Web. Our ACC, N5ART, has created a home page (http://www.qsl.net/nmsac/) which is just great. This lists individual club contacts, if they have an e-mail address. Pse send updates to n5art@juno.com. Congrats to KC5JCP, on his Silver Beaver award in the Boy Scouts, and to KB5VLC, as a new Eagle Scout and now Asst Scout Master, Troop 173, in Las Cruces! Sorry to report the passing of KF5FI, W5FAG, K5ROT, K5XL, KC5DIX, KC5QYZ, & N5DUT. They will all certainly be missed, and that is the most SKs I have ever reported in one month! Tnx & vy best 73s. Pse visit our Web-site at http://www.qsl.net/nmsac/.

UTAH: SM, Jim Rudnicki, NZ7T—Greetings. First of all, I would like to extend my sincerest thanks to one and all for your care and condolences after the death of my dad Austin Rudnicki, K6IA. I truly appreciate all your support. Now that I have had time to rest, it is time to get back to work! I find myself re-energized and ready to get out and involved in radio again. I hope to meet many of you in my travels this summer. Right off the bat we have a new SEC. Say hello and give your support to Doug Nielson; N7PPW of Alpine, UT. I know that Doug will be contacting all of the ECs and learning about ARES all around the section. Give him a warm welcome when he visits your group. Utah County also has a new EC. Welcome aboard to Derick Wolsleger, KC7KRS. We wish him well in his new appointment. By the time you read this edition, plans for the 1998 Friendship Cruise will be well underway. Amateur Radio support of the Cruise from Green River to Moab has been going on for over 35 years! Congrats and thanks to one and all who make the Cruise one of the top hamming events of the year. Have you sent in for your Field Day Packet yet? Get your clubs involved and put Utah on the air this year! If I have never mentioned your club here in SN, perhaps it's because I don't know about it. Do me a favor, if your club has a newsletter, drop me a copy. I would appreciate it! Traffic: W7MEL: 100. 73 de NZ7T.

WYOMING: SM, Bob Williams, N7LKH— The 1998 Wyoming State HamFest, sponsored by the Carbon County ARC, will be held May 23rd and 24th at the Jeffery Center in Rawlins, Wyoming. Talk-in on146.760(-). Forums, door prizes, social activities, and the ever-popular banquet along with several new equipment vendors. The program will include talks by Andy Glass, UNIX Systems Administrator for Bell South and World's foremost expert on Foxhunting. Guest speakers also include Richard Grubb, WØQM, of the NOAA Space Environment Center who will speak about solar activity and how data from NASA's ACE Spacecraft can be used to forecast geomagnetic and ionospheric disturbances. A very special highlight will be the nationwide broadcast of a roundtable discussion moderated by Steve Anderman, Executive Producer of *This Week In Amateur Radio*. For more information contact Ken Fultz, KC7RZI, (KC7RZI@ coffey.com) or visit the HamFest Web Page at: http://www.sisna.com/users/galka/ccarc.html. We look forward to seeing you there!

SOUTHEASTERN DIVISION

ALABAMA: SM, Scott Johnston, N4YYQ—ASMs: W4XI, Gordon King; N4ZNO, Roseann Johnston; KL7P, Mary Moore; KB4KOY, Norris Landry; KT4XA, Christopher Arthur; KT4JW, Tim Ganey; KC4RNF, Rick Kimbrell; KR4TZ, Bill Cleveland; KX4I, David Baughn; KA4PKB, Bob Schafer. ACC: K4LI, Ellis Dobbins. BM: KA4ZXL, John

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Murphy. OOC: KL7Q, Tom Moore. SEC: AE4WP, Joey Carter. STM: WB4GM, Eugene McGlaughn. TC: KC4RNF, Rick Kimbrell. Hello to all. Congratulations are certainly in order for all the fine amateurs in Albertville and Birmingham. You have once again done a fantastic job in having great Hamfests this year. It is always a pleasure to attend, and get to visit with everyone eyeball to eyeball, check out the bargains and have a cup of coffee. (Have you noticed how extra good that coffee tastes when it's accompanied by a fresh doughnut? hint hint) The meetings and forums were productive and informative. It was good to see that many in attendance. I appreciate it folks! If you will check your calendars, you'll notice that Field Day 1998 will soon be upon us the last weekend in June. Make plans to participate as this event is one of the most fun activities during the year: with putting up antennas, good food, good coffee, swattin' the skeeters, and gettin' very little sleep to name a few! Loads of fun awaiting us, right? Last, I want to commend each and every one who has turned in their end of the month reports. You are doing an outstanding job...keep'em rolling in, okay? Till next month 73, Scott, N4YYQ, AL SM. Tfc: WB4GM 313, W4CKS 257, W4PIM 251, N4ZNO 229, N4YYQ 75, KC4RNF 69, WA4GQS 59, W4ZBA 47, WA4LXP 34, KD4PDQ 31, AE4WP 30, W4QAT 25, AF4EG 25, KU4IJ 25, AC4CS 20, KL7Q 19, W4XI 17, W4ZGY 17, W4DGH 16, KD4TQN 13, KR4ZO 7, WB4TVY 6, KE4OLE 0.

GEORGIA: SM: Sandy Donahue, W4RU. ASM/So Ga Marshall Thigpen, W4IS. ASM/Legal: Jim Altman, W4UCK. SEC: Tom Rogers, KR4OL. STM: Dick Baxter, K5TF. SGL: Charles Griffin, WB4UVW. TC: Eddie Kosobucki, K4JNL. ACC: Jud Whatley, W4NZJ, OOC/RFI: Ed Tanton, N4XY. Lots of club activities this spring. The Athens Club will provide communications for the UGA alumni reunion on May 15-16. On April 25 they provided comm support for the Athens Airshow. Meanwhile the Albany Club had a club picnic on March 21. The Albany bunch meets every Sat at 8 AM for breakfast at the Shoneys on Dawson Blvd. They also did comm for MS walk April 18. The Middle GA ARC had an on air operating event to support the 9th annual Young Astronaut Day at Warner Robbins AFB on March 7. The Macon ARC was on the air March 21 to help celebrate the Cherry Blossom Festival. There is a new club in Claxton GA. They had a class and exams and tripled their ham population. Thanks to W4PU who is making Claxton famous for more than just fruit cakes. ECs and DECs need to report monthly to KR4OL. Tom has report forms on the ARES Web-site and you can report on-line and save a stamp. My travels in March took me to the Cherokee Capital ARS in Calhoun and the North Fulton ARL in Roswell/Alpharetta. Thanks for the hospitality at both these great clubs. Tfc: (Feb) K5TF 286, W4AET 125, WB4GGS 122, KA4HHE 69, K4BEH 68, WU4C 51, K1FP 47, WW3A 18, K4JNL 4, K4BAI 4, KE4NAY 2.

NORTHERN FLORIDA: SM, Rudy Hubbard, WA4PUP—ASM-APRS: WY8O. ASM-Youth: KO4TT. ACC: W4UE. OOC: WB4GHU. PIC: KF4HFC. SEC: WA4NDA. SGL: KC4N. STM: WX4H. TC: KO4TT. PACKET: N4GMU. Congratulations to the Cindy, Rick, and Tim on the Orlando Hamcation. It was very well organized, and the cooperation and assistance was great. The ARRL Forums were well attended. One of the suggestions made was to hold smaller meetings at the district level, and not at the State EOC in Tallahassee. The thought being more people would attend, as the seating capacity in TLH is limited, and the travel distance would not be as great in a district meeting. The Five Flags Amateur Radio Club members participated in the Blue Angel Marathon along with all of the military in the area. The Pensacola police now want an amateur to be assigned to them so they will know what is going on in the race. The W Pan District DEC, and ECs of both Escambia and Santa Rosa Counties along with ARES members participated using APRS with GPS. The race is an annual event, and the organizers make a concerted effort to make sure the amateurs will assist with their equipment. Several club newsletters are including their e-mail addresses. Some are including the members e-mail. The Area Club Coordinator, W4UE, and Public Information Coordinator, KF4HFC, are interested in receiving the e-mail addresses. This makes for much quicker contacts, and better exchange of information. John, KC4IYO, and John, W4UE, are starting a Web Page for the Northern Florida Section. Keep watch as they will be putting out info as to the URL, and the clubs, ARRL section staff, and others can input to the page, and hopefully bring news of interest to all. Your help will be necessary if this project serves the purpose intended. The week following the Hamcation, the Central and Northeastern Sections of Florida were hit with tornadoes. The amateurs were called and performed the duties in an outstanding manner. 73, Rudy. Tfc: NØZO 236, KE4OAV 212, KF4NFP 200, WB2FGL 194, KD4SIV 169, WA4NDA 149, AF4GF 140, AD4DO 138, AD4BL 118, WX4J 92, W1UKR 83, KF4TQX 79, WA4PUP 62, W4KIX 56, W5MEN 52, KB4DCR 47, KK4ND 39, KD4VJL 34, N4JAQ 33, KF4YJU 29, KJ4HS 28, WB2IMO 27, N4GMU 25, KC4FL 24, WA4EYU 19, WA1RWO 17, AB4PG 16, KE4ZTP 11, KF4BIA 10, WB4GIU 13, KE4BMI 7, KU4LY 6, AD4QH 4. W8IM 1.

SOUTHERN FLORIDA: SM, Robert "Rip" Van Winkle, AA4HT @ WD8IBY—ASM: KA4FZI @ KE2IX. ASM for Youth Activities: WB9SHT @ KB4VOL. STM: WV5Z @ N4HHP. SEC: W4SS. Asst SECs: WB2WPA @ WB2WPA, KD4GR @ KD4GR. TC: KI4T @ KD4GR. BM: WA4EIC. PIC: WA4ATF. OOC: WB4GHU @ WD8IBY. ACC: W3BLW @ W4DPH. SGL: KC4N @ W1FJI. Pkt Mgr: KB4VOL @ KB4VOL. As we all know by now, Tornadoes touched down in central Florida early Monday morning, Feb 23, with considerable loss of life and tremendous property damage. The only county involved in the southern Florida section was Osceola and they activated the ARES group immediately. I am writing this before receiving a report from the Osceola County EC, Chris Hammock, KE4DUJ, but he did tell me on the phone that the county EOC was activated and that the amateurs maintained a net continuously from the EOC until Thursday Feb 26. Several shelters were opened with Osceola County amateurs providing the communications along with help from at least two neighboring counties. I am aware that Brevard and Polk Counties furnished volunteers to help the hams in Osceola County provide communications for the shelters and other served agencies. Congratulations to the Osceola County ARES for a great job and thanks to the counties that provided them with volunteers to assist. While we are talking about ARES, don't

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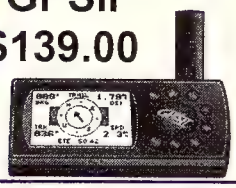

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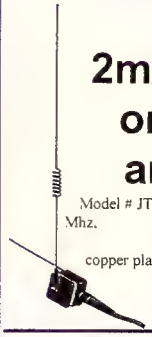

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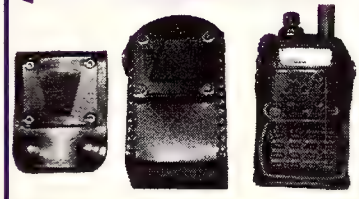

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forget the ARES/RACES Forum planned for the Governor's Hurricane Conference scheduled for June 2, 1998 in Tampa. Usually, the forum is scheduled in the afternoon from 1:30-5:00PM. The program last year was very informative and the forum was a definite success. The Florida QSO Party is scheduled for the last weekend in April thanks to the work of the Florida Contest Group. After being dormant for several years, it is great to see this contest activated again. There has been considerable publicity about the contest so I hope many of you will participate and enjoy. Congratulations to the Jupiter Tequesta Repeater Group, Inc on being approved by the League's Executive Committee to be an ARRL Affiliated Club. I read in the *QRM*, the Journal of the Tampa Amateur Radio Club, that the special-event station they had operating during the Gasparilla Invasion of Tampa was very successful. They used the special event call W4G and operated on 15, 17 and 20 meters. They worked two countries and 23 states and sent the contacts a Special Event QSL Card. I mentioned last month that the State EOC was planning another hurricane exercise this year during the May 11-15 period with Hurricane "Zeke" coming on land in the Collier County Area. I do not have any additional information at this time but you can listen in on the Southern Florida ARES Net each Saturday Morning at 8:00 AM to get further updates on the exercise. Also, I would like to request that Southern Florida Emergency Coordinators send their monthly EC Report to me until further notice. I will compile the reports and forward the information on to the ARRL. The Miami Hamboree was a another great success with excellent forums. The section ARES/NTS Forum was very informative with good participation by those in attendance. Thanks to Manny,W4SS, SEC SFL; Gary, WB2WPA, Asst SEC SFL; and Jim, KD4GR, Asst SEC SFL; for their input at the forum. Don't forget the ARRL Information Net is on 3940 kHz every Saturday morning at 7:30 AM (when there is not a major hamfest). Hope to see you there. 73 de AA4HT. Tfc: W3VR 2214, W7AMM 1034, WA9VND 908, KA2YZM 560, AB4XK 449, K4FQU 442, K4SCL 423, KB4WBY 306, KC4ZHF 297, KA4FZI 218, W4DL 217, KD4GR 169, K4PG 153, WA4EIC 152, KD4HGU 147, KE4IFD 122, WB4PAM 116, AA4HT 107, KD4JMV 97, K4RBR 95, N1RT 75, AA4BN 61, K2GNZ 60, W9LBY 49, W4DWN 47, WD4JNM 45, KT4XK 39, KE4WBI 38, WA4CSQ 36, KB4MON 36, KE4UOF 28, WB4ZVD 25, K4ENA 15, K4OVC 11, W6VIF 10, W1KAM 9, W3JI 7, K9EHP 6, W4WYR 6, WA8EXA 4, WB4TOV 1.

VIRGIN ISLANDS: SM, John Ellis, NP2B, St Croix—Folks on St John provided communications for the "Tough One" race from Cruz Bay to Coral Bay. Participating were George, KP2G; Sam, NP2FO; David, KE3LN; Jodi, N3RDL; Scotty, NP2DQ; Jim, WØNB; Mark, NP3R; Andrew, WP2E and Mal, NP2L. The group provided status of participants to the race committee as well as dispatching an ambulance. Good work, all! St Croix ARC had pleasure of seeing NP2DH, Duncan, back down from Eskimo country (literally) where he attempted to cross the Northwest Passage single handed on Nordica, his 41-foot ketch. Bad weather prevented his doing so, as there is a maximum of a 3-week window during the summer months when it can be done. Matt, NP2FK will head St. Croix ARC's participation in the America's Paradise Triathalon. Attempts to post welcome signs at airports and cruise ship facilities with local 2-meter repeater frequencies have been foiled as the VI government has a monthly fee per sign, so when you come down, bring your H-Ts, but write down the following: St John repeater-146.63, St. Thomas 146.81, St. Croix 146.91 & 147.25. Tortola BVI 146.73. Come see us! 73, John, NP2B.

SOUTHWESTERN DIVISION

ARIZONA: SM, Clifford Hauser, KD6XH—The first part of 98 is gone and I have still not done much for ARRL this year. Yes, I have visited many clubs but a lot of other things are still pending. A total of 115 new ham mailings have been sent out for the first quarter along with 53 new ARRL member welcome letters. I have used a few moments in the afternoons to work HF because the bands have been open for a little time after my work schedule; 10 meters has been good in the late afternoons, and even 20 meters has been open to the west in the early evenings. I was able to confirm Wake Island on 20 meters at 0300Z using only my vertical and 100 watts. Good news for people of Navajo county. Robert Delzer, AB7CM, has agreed to become the District Emergency Coordinator, DEC, and is presently putting together his Emergency Coordinators, ECs, that will help him. The present list of ECs are Tom James, W7OPS; Bill Smith, KC6SLU; Don Sigmund, N7RDZ; Harold Kelley, KC7TWC; and Carolyn Miolli, KA5GOY. Thanks people for helping out. Navajo county has needed help in the emergency services area for a long time. Have you visited the Arizona State Science Museum and the CARL Center? This is an active Amateur Radio station being supported and manned by volunteers to show the younger age groups what Amateur Radio is all about. Stop by and at least sign the guest book. If you can provide a little time to help man the station, call Ralph Barr, WØDNO, at 602-582-8208. Again, repeater frequencies are getting few in the metropolitan areas of Tucson and Phoenix. Several new hams have requested 2-meter repeater frequencies and we have not been able to help. If you have a set of assigned repeater frequency that is not being used or you do not need any more, please contact Ralph Turk, W7HSG, or myself, so they can be reassigned. If you have any questions on repeater interference, contact me or any of my three (3) Official Observer Coordinators, Lance Halle, KW7LH; Jim Cole, N7FD; or Alan Unangst, WC7R. Ted Downing, W7KEY, and crew is still working with the city of Tucson over Amateur Radio tower restrictions. 73, Clifford Hauser, KD6XH. Net QNI/QTC/sess: ATEN 955/148/28; ACN (2 M) 232/120/28. Tfc: K7VVC 566, AB7NK 302, WB6OTS 113, W7EP 92, W7DNJ 9.

LOS ANGELES: SM, Phineas J. Icenbice, Jr, W6BF—Our new Web site is now getting some action. We can tell because people are telling us to list their latest e-mail addresses. (www.csun.edu/~mreagan/arrlsw/lax) ADØA, Jerry, reports a traffic total of 62 for last month and W6SX, Hank, reports a total of 52. W6UBM, Al, is out of the hospital and in high gear as usual, after a successful shoulder operation. Propagation conditions are improving, so you can now check in on 3508 kHz, Mon-Fri at 7:15 PST for the Southern Cal Net. (15 WPM & up) The Net Mgr is W6ZRJ & the LA ASM ADØA, Jerry. ARRL HQ is sponsoring a new

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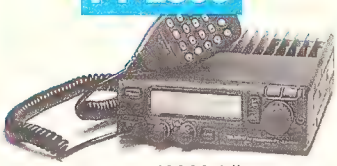

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08/97

program for "Elmers," Radio Coaches Program to raise Elmering to a new level. Contact Rick Palm or the Field Services Dept for more information on how to become involved. Edgar, N6OU, our Technical Coordinator, ("TC") has a new e-mail address (yungthor@gte.net) Edgar's phone number is (818)367-6588. Your technical problem may have a simple solution. Let Edgar give you some suggestions. The latest radio transceivers are computer controlled and built by at least three companies in the USA. One company, Kachina, has an ad in *QST*, and according to our DEC, Jim Pitman, WA6MZV, an engineer from Kachin a gave an outstanding demonstration at their club meeting. Kachina is an Arizona company and their Web site is www.kachina-ariz.com. 73 de W6BF.

ORANGE: SM, Joe H. Brown, W6UBQ—ASMs: Riv Co-Joe, KO6XB, 909-685-7441. Org Co-Art, W6XD 714-556-4396; SB Co-James, KE6LWU, 909-824-2454; Sec News/PIC-Gwyn, KE6JOF 909-685-7441; SEC Dean, KG6YS 909-687-8878. Words of Wisdom: BPARC editor, Bob Painter, WA6PLM, said, "The new rules are in effect and you can no longer ignore the reality of RF exposure to you and your neighbors." Which goes hand-in-hand with something AB6ED put in the BCWS newsletter, quoting from an article in QCWA: "It's fine to encourage new recruits and to provide them with license study material, but we need to make sure that they learn how to be hams, not just how to pass the tests. "Two of the Orange section's club presidents, in their Feb newsletters, have the right idea. Jeff Richardson, KD6NXD, of Citrus Belt C-Bar-C ARC, and Allan Avnet, AB6UB, are already calling on their club members to start planning for Field Day! New officers for Anza Valley RC are press, John Moses, K6JM; vp, Don McCoy, KG6FK, and sec Garland Moore, K6VP. Fine business! Congrats to WARA's Debbie Scott, KD6DFN, and Pat Schreihart, WA6JBX, who were awarded Ambassador-of-the-Month certificates for their untiring and smiling work as "greeters" for the club. And, a hat's off to CNARC long-time member, Norm Musselman, KN6CV, who was, once again, voted as "Ham-of-the-Year" for all his tireless work for the club. IECARO's new officers for 1998 are: chairman, Fred Roberts, W6TKV; v-chair, Joe Magaditsch, KO6XB; and sec/treas, Jim Lowman, AD6CW. This Inland Empire Council held its first Editor's Conference on Feb 14 for club newsletter editors to share ideas, information, and ways to keep each club notified of important or interesting events happening throughout the Inland Empire. Great going, guys! Congrats to HB-CERT for putting in a total of 4533 volunteer hours, and RACES-Management Team Volunteer of the year, Ed King! STM N6GIW reports for February '98: Traffic totals: KO6RZ 262, W6QZ 106, KC6SKK 88, N6GIW 40, KJ6NK 27, KD6EYI, 17, KQ6HF 12, KA6TND 4. Digital traffic: W6QS NTS BBS 510. PSHR: W6QZ 150, KO6RZ 107, KC6SKK 89. Net Mgr, KO6RZ, reported SCNV 28 Sess, QNI 266, QTC119. Vy 73, KE6JOF.

SAN DIEGO: SM, Tuck Miller, K6ZEC, 619-475-7333—ASM: Patrick Bunsold, WA6MHZ. SEC: Pat Ryan, KC6VVT. ASM/MARS: Harry Hodges, WA6YOO. ASM/Youth: Frank Forrester, KI6YG. ASM/Red Cross: Al Rich, W6WYN. ACC: Evelyn Miller, KE6YXB. BM: Steve Adams, K6PD. PIC: BJ Albright, KF6NQF. SGL: Bob Spann, KE6BJL. OOC/TC: Del Radant, N6JZE. STM: Warren Dilley, KT6A.. DECs: North: Dennis, K7DCG, South: Vacant, Imperial: Martin N6QU; East: Rich N6NKJ, Central: Dave, KC6YSO. APRS is alive and well. During a demo at the "candy store", one of our APRS gurus noticed his wife's car sitting in the same spot for over 20 minutes. The car was locked, running, and with the keys inside. Another case with APRS had stolen car recovered in very short order. Abe Lincoln paid a visit to the El Cajon folks, and has a return engagement at SOBARS in July. Abe, please don't go to the theater in the near future. Still time to get your registration in for the 1998 Ham Panda-monium, right here in San Diego, America's finest city! Get your reg form off the Internet at the San Diego section Web page. (http://www.geocities.com/siliconvalley/lakes/8400) Clubs are in high gear with Field Day preps. Thanks to all who helped with the Special Olympics the past 2 events. Are you involved in the public service area? Kenny, WA6BCC, does a great job with the Special Olympics. Need over 40 ops for 2 day period, June 6-7. Hope to see you at the DX convention in Visalia. On to traffic: KT6A 1218, KD6YJB 428, K7DCG 99, KD6IVF 18 WA6ODQ 2, WA6IIK 1. BPL: KT6A 1218. PSHR: KT6A 137, KD6YJB 97. Thanks for doing a great job! Join the SD Cnty Trfc Net, 8 PM each night on 146.730. Remember, helping others. Always worthwhile! 73, Tuck, K6ZEC.

SANTA BARBARA: SM, Rob Griffin, K6YR—805-543-3346 & k6yr@arrl.org; SEC: Jennifer Roe, AA6MX. ACC: Michael Atmore, KE6DKU. BM: Howard Coleman, W6HQA. OOC: Tom Perkins, KD6BXM. PIC: Jeff Reinhardt, AA6JR. TC: Warren Glenn, KM6RZ. ASMs: Doc Gmelin,W6ZRJ & Don Milbury,W6YN. DECs: SB-Rick Laird, KB5OO. SLO - Jack Hunter, KD6HHG & Ven-Dave Gilmore, AA6VH. Astronaut Andy Thomas in the Russian Space Station *Mir* came via Amateur Radio to a classroom at Shell Beach Elementary School on Feb thanks to Frank, KC6OXA, and his XYL, Irene, who happens to be a teacher-graduate of the NASA Space Camp. Congrats to both of them! The Satellite ARC again hosts the Annual Santa Maria Swapfest on June 21. Contact Eric, WB6FLY, for details. Make your plans to attend. Another event should be in your summer schedule: the 1998 ARRL Southwestern Division Conv, in San Diego, August 14-16. For registration, contact Sybil, W6GIC, at 619-278-4284. The '98 International DX Convention is coming up in Visalia on May 1-3. Hosted by the SoCal DX Club, it is famous for drawing world-class DXers with programs aimed at all levels of interest. Preregistration is $55 by April 15, then its $60. Contact Don, N6IC,4447 Atoll Ave, Sherman Oaks, 91423. SCN (slow speed):3598, M thru F at 1915 PST,W6ZRJ Net Mgr. SCN/SB: 9 P on 147.00+, 224.90-(131.8) & 448.875(100.00). Tfc/PSHR: K6YR 284/188, KE6MIW 29/112, W6ZRJ 83/-, KM6RZ 2/-, KE6GFV 24/92 & WA6DQK 2/70.

WEST GULF DIVISION

NORTH TEXAS: SM, Bob Adler, N5NY—Pkt: N5NY @N5NY.#DFW.TX, e-mail: n5ny@arrl.org. ASMs: KA5TTO, W5GPO, W5IWE, KG5SC, WD5IVD, KB5LES, WB7NPH, WN5PFI, N5UQA, KB5YAM, N5WOY, KJ5AE, K5RE, K5LP, K5SXK, K5ZSB, KK5NA, KK5QA, KJ5GE, KC5EWI, KC5AYL, KB5JBV, W5FB, KX5K. ACC :K4TTT. STM:

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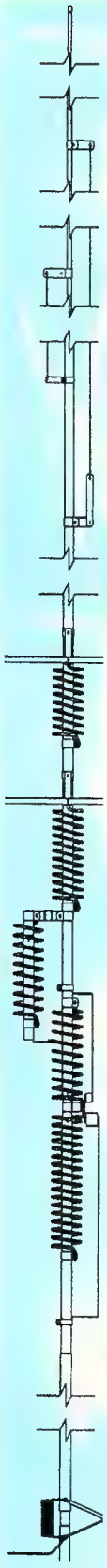

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KC5OZT. SEC: K5UPN. PIC: WW5L. SGL: N5GAR. TC: KJ5BA. OOC: WB5UDA. BM: WO5H. Greetings All! I hope that your winter has been as mild as the winter in the DFW Metroplex. The temperatures have been tolerable and we have hardly noticed a "winter" at all. My Father, KF4GJT resides in Florida (Orlando area) and as you know, their weather has been devastating with the heavy rains, tornadoes, etc. I suppose we should be thankful. For many clubs, this is the time that elections are held and volunteers are sought. Field Day will be here soon, and Section and Region-wide elections will be held later this year. Perhaps this is the time to determine whether or not your elected officials have represented you in the fashion that you had expected. Perhaps you would even like to run for an office either on a local level or even League level. Quite possibly you would be interested in a "field appointment." There are club positions, section positions as well as regional (director and vice director) that will be voted on this year. The truth of the matter is that only one thing stands in the way of change: your volunteering or running for office. Whether you run for office or volunteer, I'd like to encourage each one of you to ask yourselves exactly what we would like to change and what we expect from our leaders, then actively work to improve our policies, directions, programs and leadership to make North Texas and its clubs the best Amateur Radio area in the ARRL. I would like to commend two club presidents in North Texas for their willingness to help, lead and set an example for others: Frank Krizan,WA5ABU, and John McFadden, N5TIP. These two gentlemen are respectively the presidents of the Alcatel club and the Rockwell-Collins club. Obviously, they would like their own clubs to continue to succeed, but they are also concerned about the "bigger picture," that being the success of the NTX section. Occasionally an individual club will be more concerned with only their welfare, how far their repeater will reach, etc. While it is most admirable to be concerned with our "own" it is also necessary to consider how me can make things better for everyone rather than just a few. These two guys are the epitome of this concept. Thanks, Frank and John, you're appreciated! Another person that deserves more than just a mention is John Funningin, WN5PFI. John is an ASM but prefers to stay in the background, but he seems to be able to accomplish more there than some of us can do in the "wide open." It is people like these three folks whom I have mentioned that will assure the success of the ARRL and our own section. If your club is not an "affiliated" or special service club either contact Bob Adler, N5NY, or me and we will be happy to get you started in the right direction. Also if you would like to volunteer for the Field Organization, call either Bob or me. That's about it for this month, please call me at 972-924-3581 or e-mail me at ka5tto1@swbell.net if I may assist in any amateur-related activities. Take care and God Bless de Bob, KA5TTO.

OKLAHOMA: SM, Coy Day, N5OK—ASMs: N6CL, K5CPZ, K5TTT. SEC: W5ZTN. STM: AB5RV. ACC: KB5BOB. PIC: WA9AFM. OOC: K5WG. SGL: W5NZS. TC: KB5RV. (http://www.telepath.com/n5ok/) Congrats to Les, KB5RV, our new Technical Coordinator. Congrats to Gene, K5DLE, National QCWA recruiting contest winner. Gary Harrison, KØBC, National VP will make the presentation at Ham Holiday. Congrats to Ron Hill, KM5OZ, Deputy Director of the Oklahoma Department of Civil Emergency Management, on his new call. Kudos to KC5ZDQ, N5XDN, WA5UBO, KA5JPG, KI5SF & KC5RGX who responded within 20 min. to the Ponca City Emergency Management Director's 1:10, Friday morning wake up call. The hospital lost their telephone switch and needed comm support until the switch was restored at 8:45. Preparations for Ham Holiday '98 are in full swing. Volunteers are needed. This will be the ARRL State Convention and the 25th anniversary of HH. Thanks to John Spoon, WB5YSX, out of the nine students enrolled, The joint Kay Co. ARC and Oklahoma Independent ARC Amateur Radio licensing class graduated 6 new techs in Feb. The BBS messages and bulletins are moving fairly well again. Mark Hogan, N5OBC recently upgraded the hardware on the N5OBC-4 BBS in Broken Arrow and it has been running flawlessly. Current BBSs: K2GKK-4 (OKC), WDØAJG (Duncan), KJ5WC-4 (Stillwater), and KC5TKF (Enid). Wava, KQ6EL, reports that they got their tower and antennas up and they are working great. Tfc: N5IKN 698, WB5NKC 589, K5GBN 324, WA5OUV 76, W5CU 54, AB5RV 51, WB5NKD 42, AB5J 29, W5REC 29, KI5VV 16, KC5PDX 9.

SOUTH TEXAS: SM, E. Ray Taylor, N5NAV—ASMs: AE5ED, ex-KS5V, N5WSW, WD5GKH, K5DG, N5LYG, WA5UZB, KK5CA, WA5TUM, KB5AWM, WA5JYK, K5PFE, and K5SBU. STM: WD5GKH. SEC: K5DG. ACC: N5WSW. PIC: KA5WSS. OOC: AE5ED. We have a new ham on the air, it's KS5V, Ed Larose, with a new call AE5ED. Congratulations Ed, that's a good CW call. We have another gentleman returned from the past, Don Lamont, WD5AAH. Since retirement, Don has become a real asset to the ham community. Congratulations Don on retirement and welcome back. The DTTN is in need of net controls and check-ins, they also welcome traffic. They meet Monday - Friday 8:30 AM on 7273. Carolyn, KC5OZT, assistant manager needs your help. Robert Barron is still looking for feedback from the PIOs. With all the storm damage, it looks to me like we should have some articles for the media in your area, with a copy going to Robert and myself. We had 9 disastrous storms in February, with no reports that we are aware of. We need your input. Just after Devine, Natalia, Bigfoot, Yoakum, and Cuero were devastated by large hail, tornadoes, and high winds, the National Foam Company, in Natalia, exploded on February 19. The city was evacuated due to the toxic content of the fire and smoke. The Red Cross requested amateur support, for communications between shelters in Devine and the R.C. Office in San Antonio. Everyone, tired from the SKYWARN activities, responded for what turned out to be 24 hours of hard work. The write up by the Red Cross, in the San Antonio paper, made no mention of the ham contribution, even when their own hand-helds failed, and hams were the only means of communications. I think credit should be given to those who deserve it. This is why we need PIOs. At the time of this writing, John Weber, WB5YQC, was in the process of becoming the PIO of San Antonio, so this won't happen again. I want to thank all the hams for a job well done. I want to thank Prime Co Inc in Austin, for the use of their emergency communications van and N5IJR. I also want to thank the Baptist men's relief group for feeding the hams and the evacuees from their fine mobile kitchen. Here is the list of hams furnished by Neil Martin, WA5FSR, EC of Bexar Co: AA5XH, N5MYN, KA5IID, KC5JIL, KC5JIM, WB5YQC, KC5BGK, WA5FSR, WB5LCT, KC5BJI, K5SUZ, N5VER, N5NAV, N5CNH, K5UCQ, AC5MB, W6BOB, N5WSW, WD5UYD, N5HJP, N5QPN, W5RZH, K5JMI, and N5IJR. Again thank you for giving up your time to help others. Isn't it strange the way Amateur Radio operators get so little recognition, in the local media, with all the services they provide. The club activities are on the increase. I enjoy reading the newsletters, and notice the growth in some of our clubs. The ones with the most growth are those who are coaching potential and new amateurs. I noticed some teaching equipment and antenna construction. The more you get involved the more you will grow. Don't forget to teach the NTS system. Keep up the good work. We are well into the tornado season, let's hope we have no more damage or injuries. May God bless all. 73 and have a good month on the air. Tfc: W5YQZ 435, KK5QT 283, W5KLV 243, W5TFB 209, N5NAV 189, KS5V 167, W5RZV 120, W5CTZ 90, WB5YDD 84, N5OUJ 52, WA5FXQ 43, K5UCQ 35, W5ZX 30, WD5GKH 28, KD5GM 25, WD5AAH 19, W5SHN 15, WA5AA 14, KG5CX 8, N5BMB 7, N5LF 4, N5JUU 1.

WEST TEXAS: SM, Charlie Royall, WD5CJI, 915-944-0469 or cnroyall@wcc.net—SM sked: May-Amarillo, Pampa, Dumas, Perryton. ASMs: AI5S, W5MVJ, K5IS, WF5E. New appts: Ron Harden/KB5HGM, ASM, Abilene; Jon Platt/KC5KZP, OES; Lon Platt/KF4IWG, LGL, Midland. Special Events: Abilene ARRL Hamfest, May 2-3. Tailgate Sale and VE testing at Midland ARC Clubhouse 30 May. Section-level newsletter contest from May, 98 to Feb, 99 inclusive. Editors, pse submit newsletters each of these months to judges: SM WD5CJI; ACC K5IS/Jerome Dorrie; and Dir West Gulf Div, W5JBP/Jim Haynie. Winner will be announced at Midland Hamfest, Mar '99. Prize will be awarded for "Best in the West" newsletter. Club spotlight: Longest affiliation: El Paso ARC, 5-2-47; most overall members: Midland ARC, 168. Congrats to Dumas ARC—the nbr of hams in Moore County will more than double from 6 to 15 when their current students pass their exams. Check out the Big Spring ARC Web page (www.xroadstx.com/~josegonz/) by Pres., KB5GXW/Jose Gonzales. Welcome two new Affiliated Clubs: West Texas Connection, and El Paso Contest Club. General through Amateur Extra licensees decreased by 2.8% in '96; Tech increased 35%. General license instruction is needed nationwide. Volunteer to be an instructor and/or Elmer and assist those who wish to upgrade!

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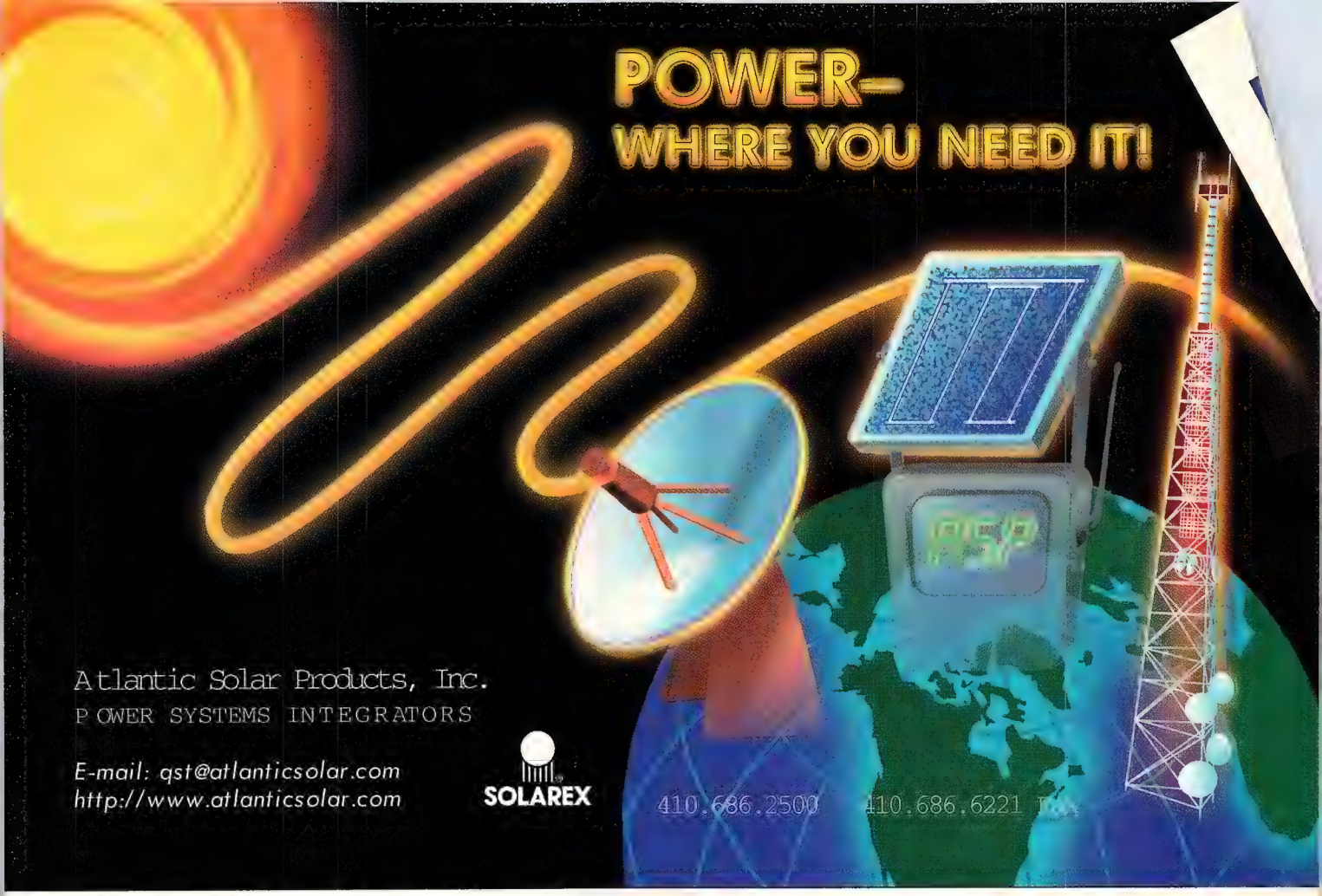

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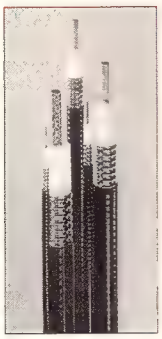

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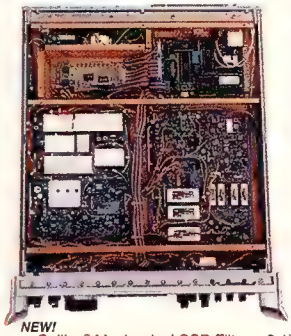

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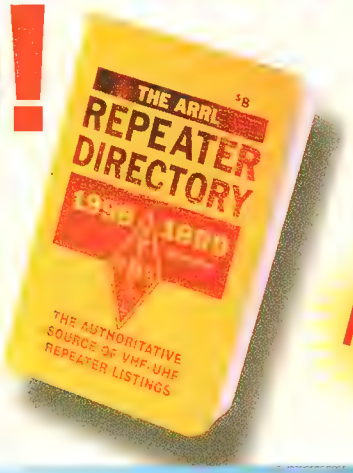

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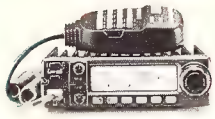

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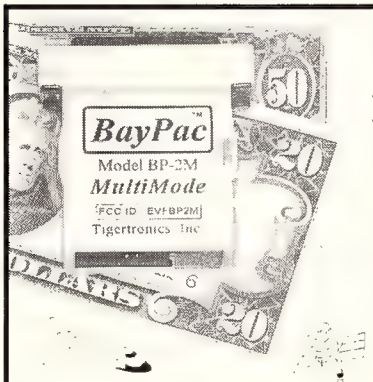

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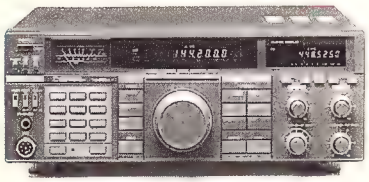

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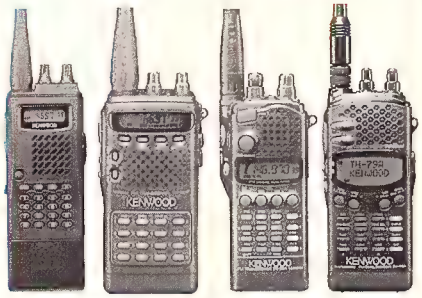

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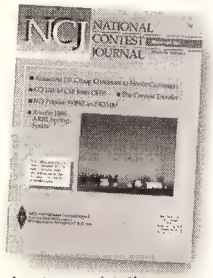

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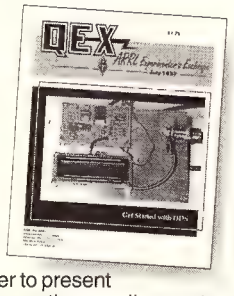

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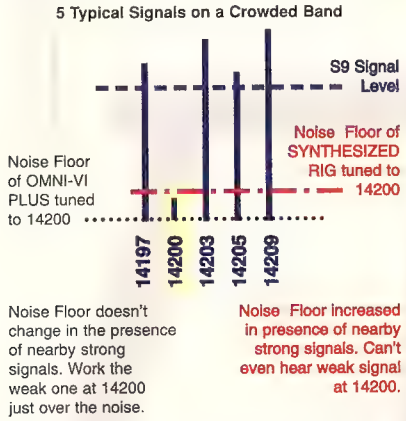
5 Typical Signals on a Crowded Band
S9 Signal Level
Noise Floor of SYNTHESIZED RIG tuned to 14200
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14197
14200
14203
14205
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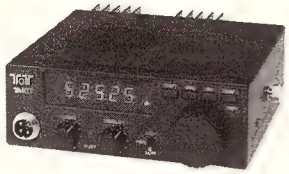
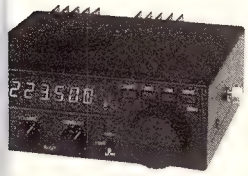
ame features as 2 meter model.
overs 50.095 - 54.1 MHz.



260.....5 watts out.....$195*
orry, FCC rules forbid sales of add-on power amp)



222 MHz FM TRANSCEIVER

Same features as 2 and 6 meter models. Covers 222 - 225 MHz in 10 kHz steps. 4 watts out on low power, 20 watts out on high.

1230.....$295*

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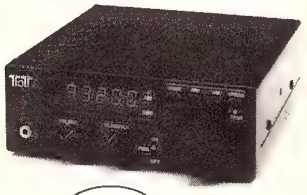

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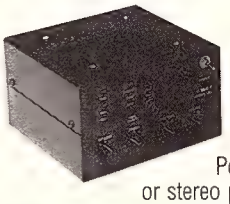

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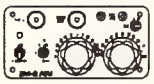

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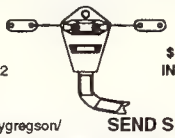

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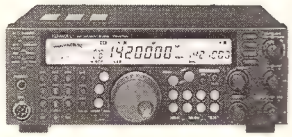

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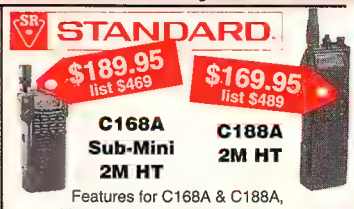

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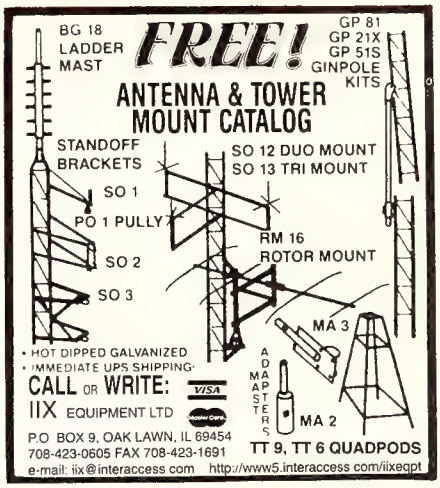

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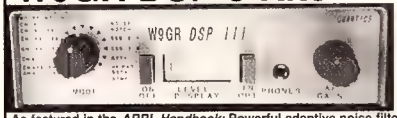

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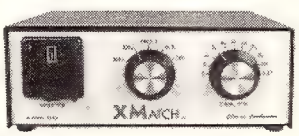

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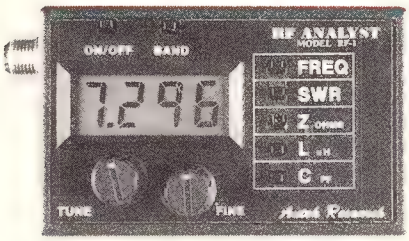

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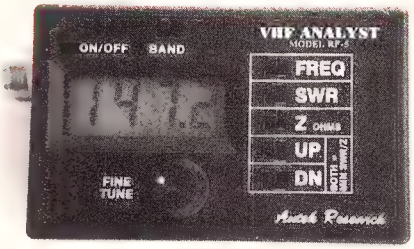

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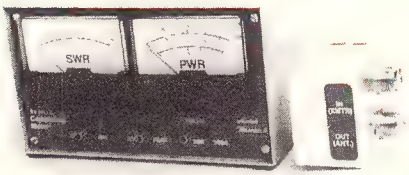

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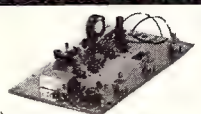

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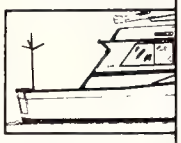
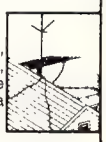


At Home

If you live in an apartment, condominium or restricted area, the Spider™ may well be the answer to your antenna problems.



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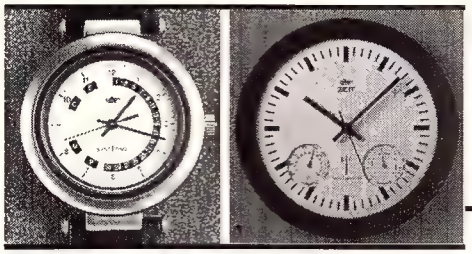

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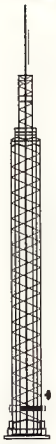

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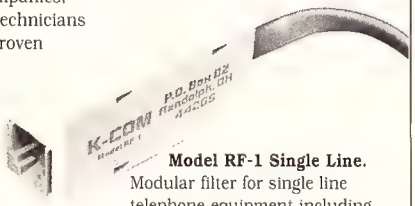

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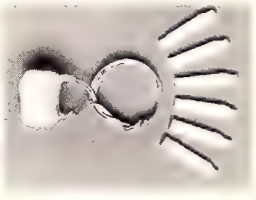

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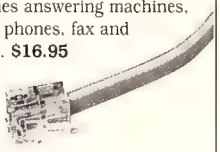

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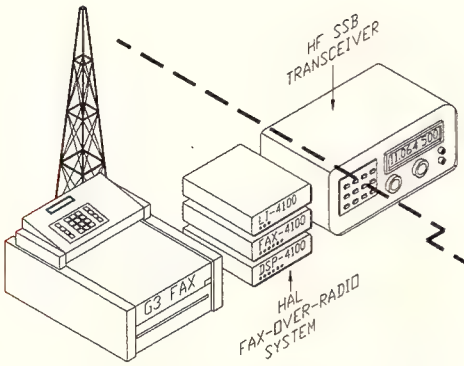


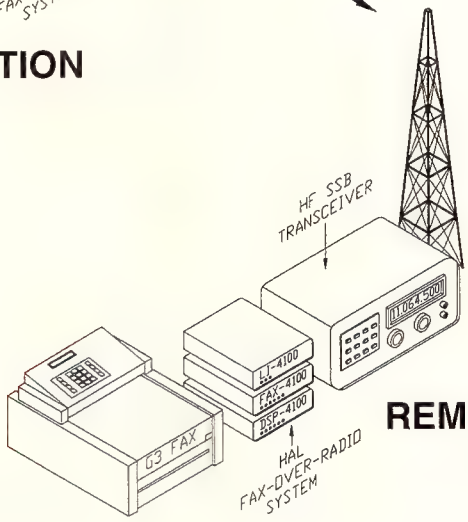
BASE STATION

AT THE BASE STATION:

1. Lay page on FAX machine
2. Dial remote station
3. Push "GO" on FAX
4. Radio link is requested

AT THE REMOTE STATION

1. Radio link is established
2. Remote FAX machine is "called"
3. FAX data is received from base
4. FAX data is printed on remote FAX



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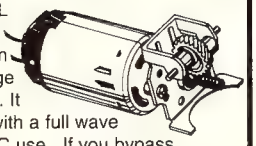

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D-42	10/15/20/40	2	55'	74.95
D-52	10/15/20/40/80	2	105'	79.95
D-56	10/15/20/40/80	6	82'	125.95
D-68	10/15/20/40/80/160	8	146'	162.95

TRAP VERTICALS-"SLOPERS":*

VS-42	10/15/20/40	2	24'	64.95
VS-53	10/15/20/40/80	3	42'	79.95
VS-64	10/15/20/40/80/160	4	73'	98.95

* Can be used without radials
* Feedline can be buried if desired
* End Fed
* Permanent or Portable Use

ALL TRAP ANTENNAS are Ready to Use - Coax Fed - Factory Assembled - Commercial Quality - Handles 600 Watts - Comes complete with: Deluxe Traps, Deluxe Center Connector, 14 ga. Stranded Antenna Wire and End Insulators. Automatic Band Switching - Tuner usually never required - For All Transmitters, Receivers, & Transceivers - For All Class Amateurs - One Feedline works All Bands - Instructions included.

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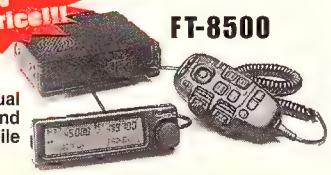

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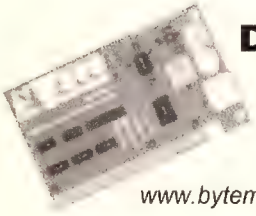

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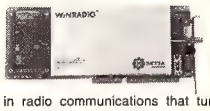

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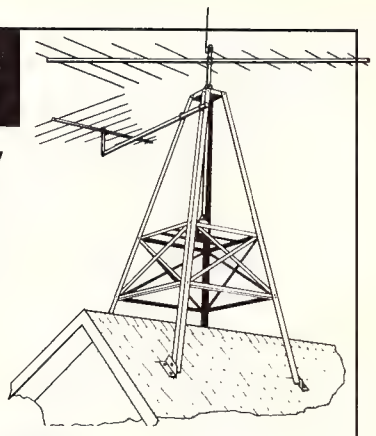

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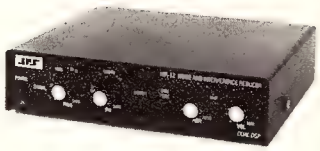

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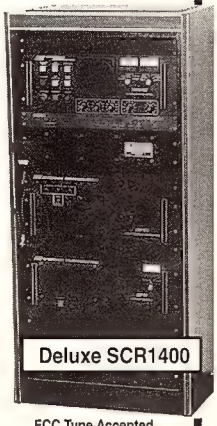

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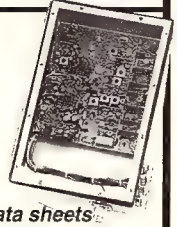

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NEW X-25 twin lead HF antenna, 10-160 meters. Works great. 50' coax. $88.50 check or money order to Roger Snoke, P.O. Box 8082, La Verne, CA 91750-8082.

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R390A RECEIVERS. Parts and decks for sale. George, K1ANX, 413-527-4304.

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LMR 400 SOLID CCA CNTR FOIL + BRAID 2.7dB @ 450MHz WP/UV JKT	.59/FT	.57/FT	.55/FT
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COAX (50 OHM "HF" GROUP)	100FT/UP	500FT	1000FT
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RG8/U STRD BC FOAM 95% BRAID UV RESISTANT JKT 0.9dB/1350WATTS @ 30MHz..	.32/FT	.30/FT	.28/FT
RG8 MINI(X)95% BRAID UV RESISTANT JACKET 2.0dB/875 WATTS @ 30MHz	.15/FT	.13/FT	.12/FT
RG58/U 95% BRAID UV RESISTANT JACKET 2.5dB/400 WATTS@ 30MHz	.15/FT	.13/FT	.11/FT
RG58A/U STRD CENTER 95% TC BRD UV RESISTANT JKT 2.6dB/350 WATTS @ 30MHz	.17/FT	.15/FT	.13/FT

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RG142/U SOLID SCCS 2-95% SILVER BRAIDS TEFLON JKT 8.2dB/1100WATTS @ 400MHz	25FT/UP	1.25/FT	
RG303/U SOLID SCCS 1-95% SILVER BRAID TEFLON JKT 8.6dB/1100WATTS @ 400MHz	25FT/UP	1.00/FT	

COAX (75 OHM GROUP)	100FT/UP	500FT	1000FT
RG11/U SOLID BC (VP-78%) 95% BRAID NC/DB/UV JKT 1.1dB/800WATTS	.40/FT	.38/FT	.36/FT
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RG6/U CATV FOAM 18GA CC8 FOIL + 60% ALUM BRAID	.14/FT	.12/FT	.10/FT

LADDER LINE GROUP	100FT/UP	500FT	1000FT
450 OHM 18GA SOLID CCS (POWER: FULL LEGAL LIMIT)	.12/FT	.10/FT	.09/FT
"FLEXIBLE" 450 OHM 16GA COMPRESSED STRD CCS(PWR-FULL LEGAL LIMIT+)	.20/FT	.18/FT	.16/FT
"FLEXIBLE" 450 OHM 14GA COMPRESSED STRD CCS(PWR-FULL LEGAL LIMIT++)	.25/FT	.24/FT	.23/FT
300 OHM 20GA STRD (POWER: FULL LEGAL LIMIT)	.15/FT	.13/FT	.12/FT

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5971CPS125. 125ft (cable same as above) w/Jones plug to socket assembly	$39.95/ea		
1618 8/COND (2/16 6/18) BLK UV RES JKT. Recommended up to 200ft	.35/FT	.34/FT	.32/FT
1418 8/COND (2/14 6/18) BLK UV RES JKT. Recommended up to 300ft	.47/FT	.45/FT	.43/FT
1216 8/COND (2/12 6/16) BLK UV RES JKT. Recommended up to 500ft	.78/FT	.74/FT	.70/FT
2206 22GA STRD 6/COND PVC JACKET	.18/FT	.16/FT	.14/FT
1806 18GA STRD 6/COND PVC JACKET	.23/FT	.21/FT	.19/FT

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14GA 168 STRD *"SUPERFLEX" (great for Quads & Portable set-ups etc.)*	.12/FT	.10/FT	.08/FT
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6FT *"FLEXIBLE"* 9913 FOIL+95% BRAID 2.7dB @ 400 MHz	12.95/EA
3FT *"FLEXIBLE"* 9913 FOIL +95% BRAID 2.7dB @ 400 MHz	11.95/EA
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75FT RG213/U MIL-SPEC DIRECT BURIAL JKT 1.5dB @ 50MHz	39.95/EA
50FT RG213/U MIL-SPEC DIRECT BURIAL JKT 1.5 dB @ 50MHz	29.95/EA
25FT RG213/U MIL-SPEC DIRECT BURIAL JKT 1.5 dB @ 50MHz	19.95/EA
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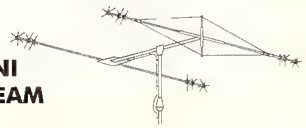

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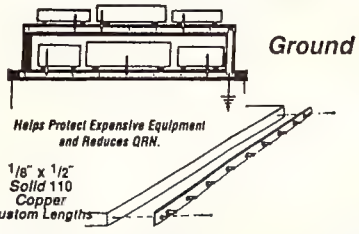

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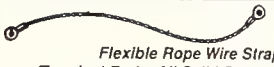

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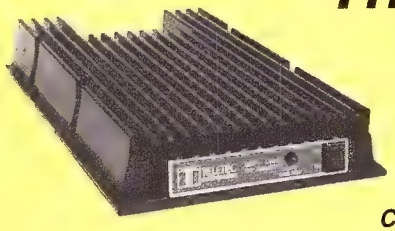

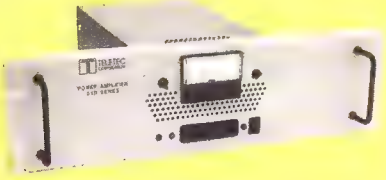

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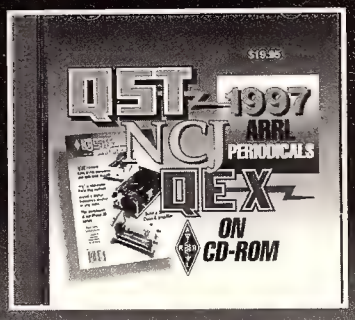

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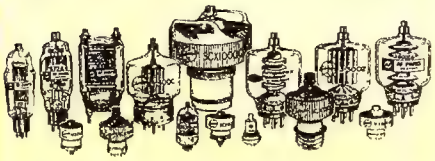

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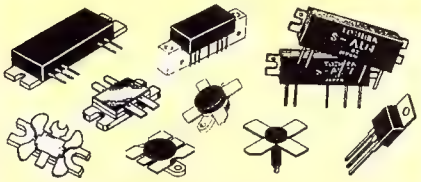

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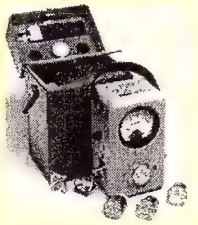

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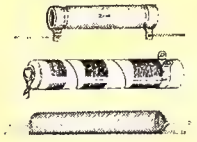

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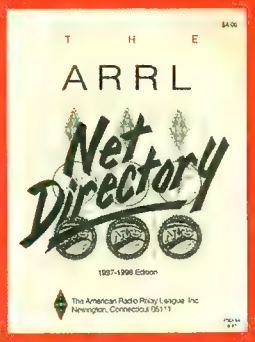

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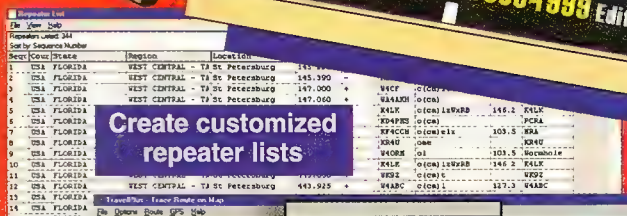

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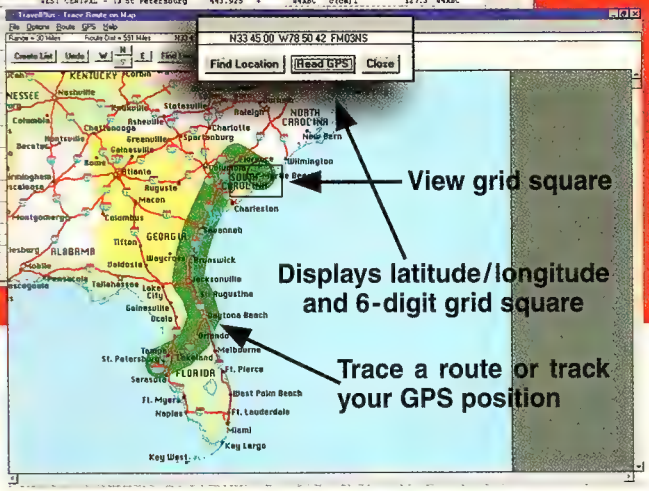
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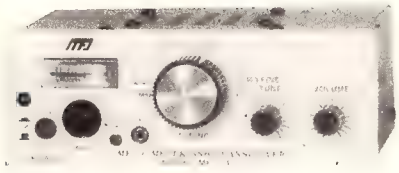

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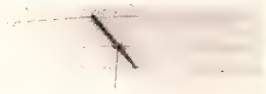

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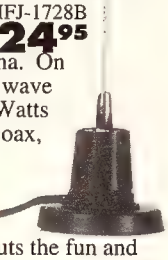

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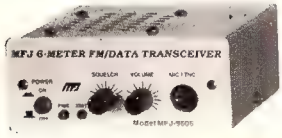

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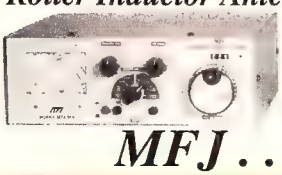

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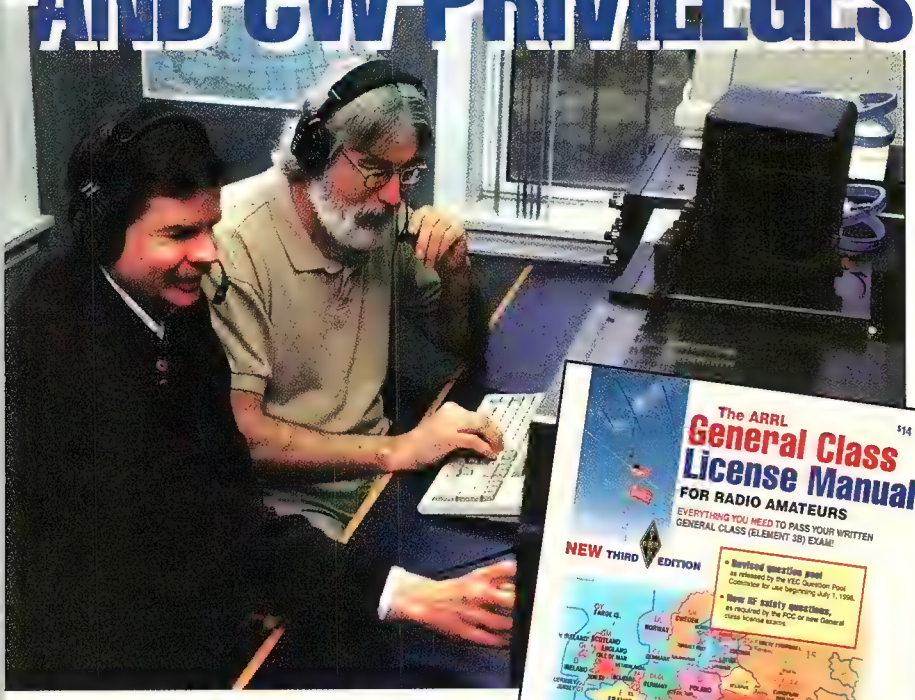

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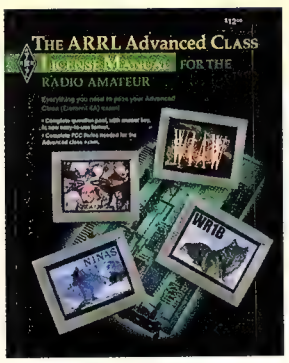

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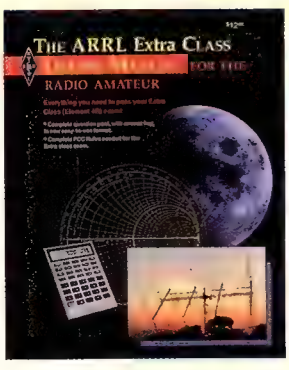

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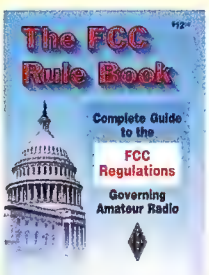

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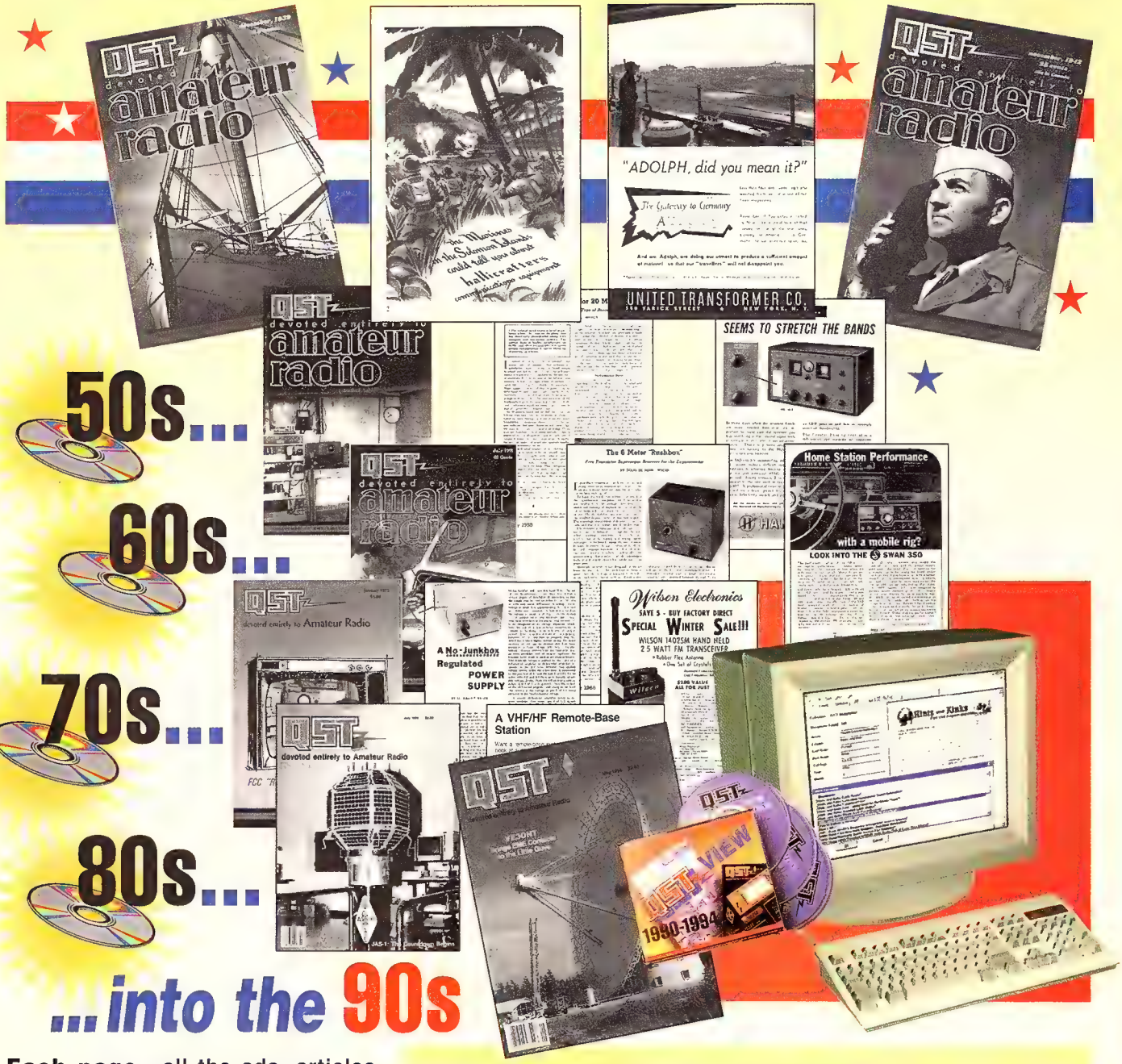

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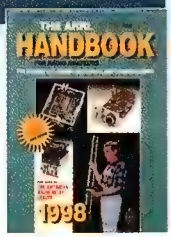

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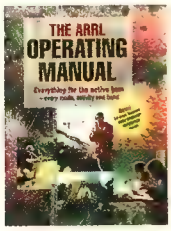

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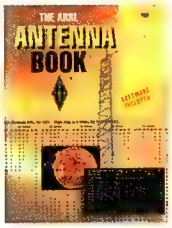

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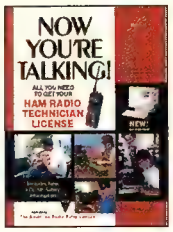

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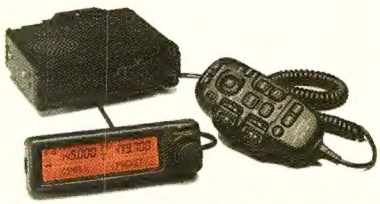
*** PLUS $100 OFF YAESU COUPON!**

FT-847 ..... Please Call
HF//6M/2M/430MHz • DSP • 100 W Output
• Auto Tuner • 1200/9600 packet ready
NOW SHIPPING!



FT-8500, 2m/70cm Mobile HUGE SPECIAL!
FT-8100*, NEW 2m/70cm Mobile .... Call!
*** PLUS $35 OFF YAESU COUPON!**

Texas Towers has Yaesu specials galore! In addition to our every day low prices, Yaesu is offering additional savings coupons for several of the radios shown on this page. So be sure to give us a call – Texas Towers really does sell for less!

Features: 34 sq. ft. capacity, 450° rotation, preset control, and more!

G-2800SDX (34 sq. ft.) ... Call for price!
G-1000SDX (23.5 sq ft. ... Call for price!
G-800S / SDX (17 sq. ft.) ... Please Call!
G-450XL (11 sq. ft.) ..... Please Call!
G-5400B Az/Elevation ..... Please Call!
G-500 Elevation Rotor ... Call for price!
EXCELLENT ROTATOR DEALS!

FT-920 ... New, Call For Special Price
• HF–6m • DSP • Auto Tuner • More
PLUS $100 OFF YAESU COUPON!

FT-840 ..... Call For Yaesu Special
• 160–10m XCVR • 100 W Output • FM Optic
• Compact Size • LCD Display • Much Mo
PLUS $100 OFF YAESU COUPON!

FT-2500* 2m Mobile XCVR .....Ca
FT-3000 2M Mobile XCVR, 70W .....Ca
CALL FOR SPECIAL PRICE!

FT-11R High Power ....Call!
- Super Compact 2m FM HT
- 150 Memory Channels
- Alpha Numeric Display
- AM Receive (110–138 MHz)
- Autodial Memory (10 Channels)
- CTCSS Tone Encode
- Optional CTCSS Decode
- DTMF Paging
- DTMF Squelch
- DTMF Memory (11 Channels)
- Direct Keypad Frequency Entry
- Extended RX (118–174 MHz)
- Supplied with FNB-31 NiCad Battery Pack, Wall Charger, Belt Clip, Rubber Duck Antenna, and More!

EXCELLENT 2M HT PERFORMANCE!

FT-50RD.....Please Call!
- Compact 2m/70cm HT
- Built to Mil. Spec. MIL-STD 810
- 112 Memory Channels
- CTCSS Tone Encode
- CTCSS Tone Decode
- DTMF Paging
- DTMF Squelch
- Dual Watch
- Extended RX 76–200 MHz
  300–540 MHz
  590–999 MHz
  (Cellular Blocked)
- Optional ADMS-1D Software
- Supplied with NiCad Battery Pack, Wall Charger, Belt Clip, Rubber Duck Antenna, and More!

PLUS $20 OFF YAESU COUPON!

FT-51RH ..... Ca
- Tiny 2m and 70cm FM HT
- 120 Memory Channels
- Alpha Numeric Display
- AM Receive (110–138 MHz)
- Autodial Memory (10 Channels
- CTCSS Tone Encode
- CTCSS Tone Decode
- CTCSS Scan (Finds Tone)
- DTMF Paging & Squelch
- 5 Watts RF Output
- Direct Keypad Frequency Entr
- Extended RX (110–180 MHz)
- Extended RX (420–470 MHz)
- Supplied with FNB-31 NiCad Battery, Charger, Belt Clip, Rubber Duck, and More!

CALL FOR SPECIAL PRICE!

Prices, specifications, and stock quantities are subject to change without notice or obligation. Yaesu coupons expire April 30, 1998.

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EARTH STATION FT-847

HF/50/144/430 MHz All Mode Transceiver

"Compact, too--great for our next 'rover' operation."

"HF, VHF/UHF, and satellite, all-in-one!"

"Looks like Yaesu did it again!"

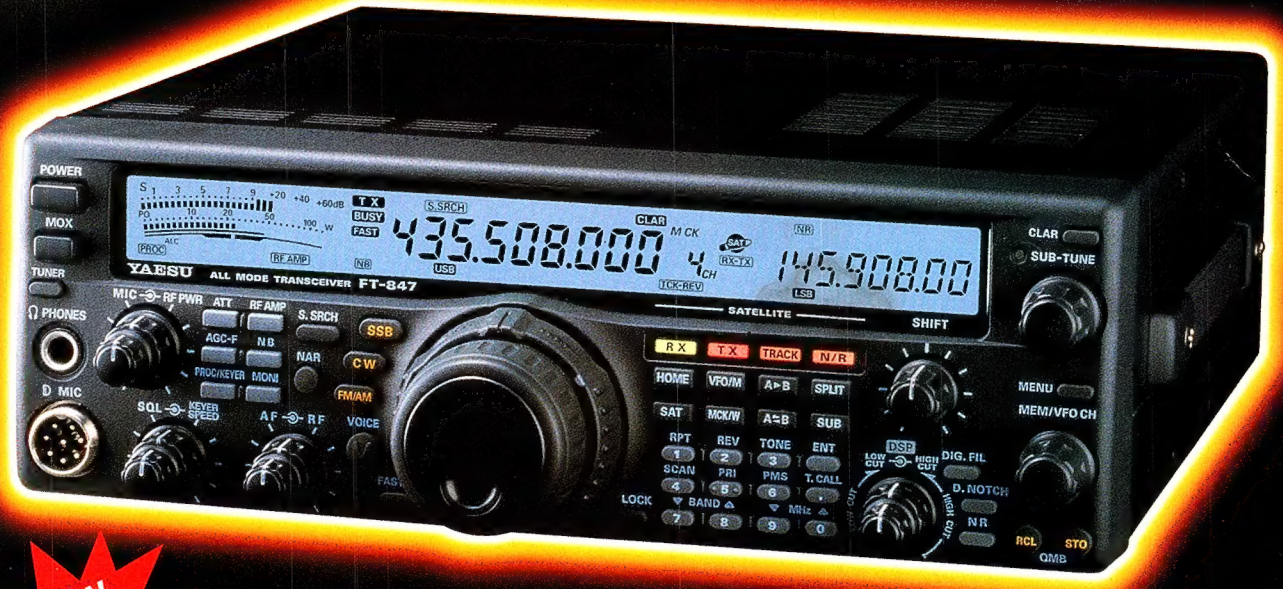
"And the DSP helped me hear my first moonbounce signal ever!"

The FT-847 changes base station operation forever. Now, three radios in one--HF, VHF/UHF, satellite; technology in its finest application, from the world leader in amateur communication.

With its unequaled combination of features, like DSP filters—notch, NR and BPF, built-in 6-meter, voice monitor, separate sub-band dial, Shuttle Jog dial, Smart Search, and digital meter, the FT-847 is the only radio of its kind! Exclusively for satellite work, 19 memories exceed any other radio. For performance, power-up with 100W for HF/6-meter, and 50W for 2-meter and 430 MHz. Additional "must-haves" include cross-band full duplex, normal/reverse tracking, CTCSS and DCS encode/decode, and direct keypad frequency entry. Plus, the FT-847 is 1200/9600 bps packet-ready.

Take the next step in all-band performance and take home the FT-847 today!

Only one transceiver gives you all mode operations on HF/50/144/430 MHz with full Satellite capability.



NEW Yaesu Patented Design

ATAS-100

Active Tuning Antenna System

Designed for the FT-847. Works on 7/14/21/28/50/144/430 MHz Amateur Bands for mobile operation.

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Choice of the World's top DX'ers

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Specifications subject to change without notice. Specifications guaranteed only within amateur bands.
Some accessories and/or options are standard in certainareas. Check with your local Yaesu dealer for specific details.

Seeing is Transceiving

Portable SSTV is here! Kenwood's new VC-H1 Visual Communicator combines an image-scan converter, CCD camera and LCD monitor in a compact battery-operated unit. Simply hook it up to your Kenwood transceiver to start sending and receiving color images over the air.

VC-H1 Visual Communicator

Ideal for outdoor SSTV

Until now, for anyone interested in SSTV (slow-scan television), portability has not been an option. But thanks to component miniaturization the VC-H1 is not only small enough for handheld use but it runs off 4 AA batteries so you can take it anywhere. This makes it ideal for field days, special events, disaster communications and even fishing trips.

Full compatibility

The VC-H1 can be connected to any transceiver with just a cable, and it offers full compatibility with all of the standard SSTV formats. Uploads/downloads are quick and easy; the images are also sharp and clear.

All-in-one design

In addition to the detachable 1/4-inch CCD camera, the VC-H1 features a 1.8-inch color TFT (thin film transistor)-type display. As well as viewing incoming pictures, you can review your own prior to transmission. The built-in microphone & speaker can be used in place of a separate speaker-microphone for your transceiver.

Image memory

Up to 10 pictures can be stored in memory. This allows you to compare and pick the best shot to send. You can also store incoming pictures and protect them from unintentional deletion.

Computer connectivity

One of the great features of the VC-H1 is the ability to work with a personal computer. Hook it up to the RS-232C port on your laptop using the optional connection kit (includes Microsoft® Windows® 95 so[illegible]) and you can save pictures (in JPEG [illegible]) that you send and receive. You can then cut and paste using standard graphics software, or even superimpose your own text. What's more, you can actually control the VC-H1 from your computer.

Call sign superimpose

AF mute

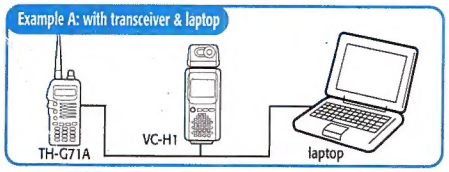
Auto power-off

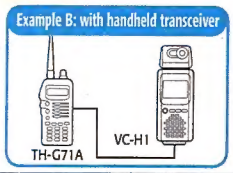
270,000-pixel CCD image sensor
360-degree rotatable camera head (detachable)
1.8-inch TFT-type color display
Operates on 4 AA alkaline batteries
Microphone & speaker

SPECIFICATIONS

• Terminals : Data I/O (for transceiver), Video in, Video out, COM (for computer),DC IN (4.8 ~ 7.0V) • Dimensions, projections not included (WxHxD): 2-5/8 x 1-3/8 x 6-3/4 in (62 x 30 x 160 mm)

Specifications are subject to change without notice.
Screen-shot photographs are simulated.
Microsoft and Windows are registered trademarks of Microsoft Corporation





TH-G71A
144/440MHz
FM Dual Bander

- 6W (VHF), 5.5W (UHF)
- PC programmable
- 200 memory ch. with alphanumeric display
- MIL-STD 810E (rain & shock)
- CTCSS tone scan
- DTMF memory (10 ch. up to 16 digits)
- Wide-range coverage

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